TECHNICAL APPENDIX F

Air Quality Analysis

Environmental Impact Statement &
Environmental Impact Report
for the proposed

Mesquite Regional Landfill

Imperial County, California

SCH. No. 92051024
BLM No. CA-060-02-5440-10-B026

Prepared by the
Bureau of Land Management
California Desert District

and the
County of Imperial
Planning & Building Department

Environmental Consultant
The Butler Roach Group, Inc.
San Diego, California

April 1994

TECHNICAL APPENDIX F

AIR QUALITY ANALYSIS

ENVIRONMENTAL IMPACT STATEMENT
ENVIRONMENTAL IMPACT REPORT

for the proposed

MESQUITE REGIONAL LANDFILL

IMPERIAL COUNTY, CALIFORNIA

SCH. No. 92051024
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prepared for

BUREAU OF LAND MANAGEMENT
California Desert District
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El Centro, California

MESQUITE REGIONAL LANDFILL EIS/EIR

APPENDIX F

AIR QUALITY ANALYSIS

DECEMBER 1993

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AIR QUALITY TECHNICAL REPORT FOR THE PROPOSED MESQUITE REGIONAL LANDFILL IMPERIAL COUNTY

Prepared For:

ARID OPERATIONS INC.

March 1994

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1.0 GENERAL

1.1 SCOPE

1. This report describes the air quality analysis conducted for the proposed Mesquite Regional Landfill in Imperial County, California. The existing air resource environment is described both for the site and for the route of the trains that would haul the municipal solid waste (MSW) residue from Los Angeles County to the landfill. The analysis of potential environmental impact at the site is described in detail, while the potential environmental impact of the rail-haul is treated as a comparison with the No Action Alternative, which is based on trucks hauling MSW residue to local landfills in the Los Angeles County. If the MSW residue proposed to be transported and landfilled at the Mesquite Regional Landfill were transported to and landfilled at a different regional landfill located outside of SOCAB, air quality impacts and benefits would be similar to those described in this Technical Report for the Proposed Action.

2. The primary air quality considerations directly associated with the Proposed Action are those related to onsite activities. These include:
   - Unloading MSW residue containers from trains at the site intermodal facility.
   - Truck-hauling containers from the intermodal facility to the active face of the landfill.
   - Emptying containers by a tipper at the foot of the active face.
   - Placing MSW residue in five 2-foot thick layers on the active face and compacting them into one lift.
   - Placing daily cover materials.
   - Collecting and destroying landfill gas (LFG), or using it for energy recovery.
   - Ongoing construction to expand the disposal area and close completed portions.

   Each of these activities is analyzed for potential air quality impacts.

3. The primary offsite air quality considerations are associated with trains which would be used to haul MSW residue to the landfill. The rail-haul route would be along the Southern Pacific Transportation Company (SP) main line shown in Figure 1.1. An intermodal facility at the Los Angeles Transportation Center (LATC) rail yard near downtown Los Angeles is considered to be the starting point for all or the majority of waste-by-rail traffic on this existing main line to the Proposed Mesquite Regional Landfill spur that would be installed about one-half mile north of Glamis and parallel to Highway 78 in Imperial County. The air quality aspects of this rail transportation are also analyzed.

4. Local curbside packer truck traffic to transfer stations and material recovery facilities (MRFs) in Los Angeles County or other southern California counties does not result in emissions which are related to the Proposed Action. These MSW collection activities would occur regardless of where the landfill is located, and are not analyzed.

5. Transfer trucks hauling containers of compacted MSW residue from transfer stations and MRFs to the LATC intermodal facility could potentially be considered a project-related activity. However, the mileage associated with this haul would be expected to be less than that associated with the transport of transfer trucks to future landfills located in more remote Los Angeles County areas. Therefore, the air emissions for transfer to the LATC would improve local vehicle emissions. This improvement is considered in evaluating the No Action Alternative.

6. At the LATC intermodal facility, the containers of MSW residue would be unloaded from the trucks by cranes and loaded onto the train. A train would have four diesel locomotives pulling 16 articulated rail cars, with five sections to each car, and two containers held by a section. A train would carry 160 containers, and a container would hold 25 tons of MSW residue. At the LATC, the train would be separated into two 8-car segments by line-haul locomotives. Switching engines would not normally be used for these waste-haul trains.

7. When a train travels to and from the landfill, it would cause short-term delays of highway vehicles at grade crossings. The potential air quality impacts of these delays are analyzed.

8. For analysis of onsite and offsite air quality, the affected environment is described in terms of the project site, and the following geographic areas (Figure 1.1):
   - South Coast Air Basin (SOCAB), including:
     - The Los Angeles Basin from the ocean to the Banning and Cajon passes, including most of Los Angeles County, Orange County, the southwest corner of San Bernardino County, and the western third of Riverside County.
   - The Salton Trough part of the Southeast Desert Air Basin (SEDAB), including:
     - The Coachella Valley, extending from Banning Pass to the Salton Sea, primarily in Riverside County.
     - Imperial County, extending southeast from the Salton Sea to the border with Arizona and Mexico.

   Although the Salton Trough is a single, long, linear geologic feature or "valley" that channels air flow, it is divided into Coachella Valley and Imperial County because of political and air quality control jurisdictions discussed in Section 1.2.

9. An important introductory scoping consideration is related to ozone (O_3), which is the key air pollutant in smog. O_3 itself is not emitted directly from cars, factories, and other sources, but instead is formed in the presence of sunlight from two "precursor" pollutants which are emitted: nitrogen oxides (NO_x) and reactive organic gases (ROG). NO_x is the sum of nitrogen dioxide (NO_2) and nitric oxide (NO). Exceedances of California and national ambient air quality standards for O_3 in SOCAB are considered to be the worst in the country. Exceedances of these O_3 standards occur less frequently in the Coachella Valley than in SOCAB, and only a few times a year in Imperial County, where only California O_3 standards are exceeded. The cause of O_3 exceedances in Imperial County is not clear, but appears to be pollutant transport from Mexicali, Mexico, SOCAB and possibly San Diego (CARB, 1989a), in addition to a contribution from local emissions (Sonoma Technology, Inc., 1992). The importance of transport requires that both SOCAB and the Salton Trough be evaluated with respect to O_3.

10. Another important scoping consideration for the air quality analysis is particulate matter (PM_{10}), which are particles with an aerodynamic diameter equal to or less than 10 micrometers. Transport is also important to PM_{10} exceedances in Imperial County. A study (Desert Research Institute, 1991) during 1992 and 1993 has been attempting to determine what sources account for the PM_{10} measured at Calexico, El Centro, and Brawley. Results are expected sometime in 1994.

11. Finally, in addition to air pollutant emissions, odor is considered in this technical report as an air quality issue. Existing odor conditions in the areas of interest are briefly described in Chapter 3.0, and odor impacts are evaluated in Section 6.4.2.

1.2 REGULATORY STATUS

1.2.1 GENERAL

1. Primary air quality regulatory jurisdiction for the proposed landfill resides locally through the Imperial County Air Pollution Control District (ICAPCD). The ICAPCD rules which will be used for project air quality permitting have been developed as a result of federal and state laws and regulations. Sections 1.2.2 and 1.2.3 summarize general federal and state requirements, respectively. Section 1.2.4 covers site-specific ICAPCD permitting requirements. Section 1.2.5 describes the indirect interest of the South Coast Air Quality Management District (SCAQMD) which has local jurisdiction in SOCAB and the Riverside County portion of SEDAB.

1.2.2 FEDERAL REGULATIONS

1.2.2.1 National Ambient Air Quality Standards and Attainment Status

1. The Clean Air Act of 1970 (CAA) established National Ambient Air Quality Standards (NAAQS) which set maximum allowable ambient concentrations, given in Table 1.1, for the following "criteria" air pollutants:

   - O_3
   - NO_2
   - Sulfur dioxide (SO_2)
   - Carbon monoxide (CO)
   - PM_{10}
   - Lead (Pb)

   There are primary and secondary NAAQS, as shown in Table 1.1.

2. The primary standards are intended to protect public health, including an adequate margin of safety. Areas violating national primary standards are termed federal "nonattainment areas." The Clean Air Act Amendments of 1990 (CAAA) defined five classes of increasing nonattainment: marginal, moderate, serious, severe, and extreme. SOCAB is the only area in the United States, with respect to O_3, that is classified as "extreme." Areas where monitoring data show the ambient air quality is better than NAAQS are classified "attainment areas," while areas with inadequate monitoring data to classify as attainment or nonattainment are called "unclassified areas."

3. The secondary standards are intended to protect public welfare, including crops, livestock, vegetation, buildings, and visibility from other known or anticipated adverse effects of a pollutant. Exceedances of the secondary standards do not lead to specific regulatory responses, and nonattainment of secondary standards is neither defined nor reported.

4. The CAAA has 11 parts, called titles. Two of these titles have special relevance to air quality analysis: Title I - Provisions for Attainment and Maintenance of the NAAQS; and Title II - Provisions Relating to Mobile Sources. Title I contains provisions for attainment and maintenance of the NAAQS and focuses on the nonattainment areas of the nation, with primary emphasis on O_3 nonattainment. Areas that do not attain the NAAQS are required by the CAA to prepare Air Quality Attainment Plans (AQAPs) to control existing and proposed sources of air pollutant emissions, such that the NAAQS may be attained by a certain target date. SCAQMD published a final air quality management plan in July 1991, which includes 134 measures to reduce criteria pollutant concentrations below national and California standards, including waste-by-rail disposal of MSW residue at remote sites outside of the

Los Angeles Basin. As of February 18, 1993, the ICAPCD has an approved AQAP for O_3, which is discussed in Section 1.2.4. This plan proposes a rule for adoption in 1994 that would require an impermeable soil cover, an LFG collection system, and treatment of the collected gas for sale, incineration, or electricity generation.

5. O_3 nonattainment is addressed before nonattainment of other criteria pollutants from the viewpoint of CAA priorities. ICAPCD will develop a separate AQAP for solving PM_{10} nonattainment. Already SCAQMD has developed a special PM_{10} attainment plan for the Coachella Valley, while their 1991 Air Quality Management Plan covers all criteria pollutants.

6. To bring federal nonattainment areas into attainment, the CAA contains general requirements for the review of new and modified stationary sources. This review requires that new emissions proposed for a criteria pollutant or its precursors from a stationary source in a nonattainment area cannot be permitted without elimination of an equal or greater amount of the same pollutant or its precursors through "offsets." The amount of offsets required usually increases with the distance between the proposed and eliminated sources. The offset ratio is never less than 1.0 to assure that no net increase occurs.

7. Title II of the CAAA contains provisions relating to mobile sources. Diesel fuel for highway vehicles were required to have a sulfur content of less than 0.05 percent after October 1, 1993, which will reduce the sulfur oxides (SO_x) and particulate emissions of most trucks and heavy-duty equipment. SO_x emissions lead to ambient concentrations of the criteria pollutant SO_2, and are precursors of PM_{10}. Light-duty trucks will be subject to stricter emissions limitations on NO_x, nonmethane hydrocarbons (NMHC) and CO, beginning with the 1994 model year. Heavy-duty trucks will be subject to NO_x engine emission limitations, beginning with the 1998 model year. Title II does not contain provisions relating to locomotives, although it is anticipated that the low-sulfur diesel fuel will also be used for trains after 1993.

1.2.2.2 <u>Prevention of Significant Deterioration (PSD) Program</u>

1. Where ambient air quality concentrations are lower than NAAQS, the PSD program is aimed at controlling stationary sources, and maintaining the air quality in such attainment areas. The program provides special protection for federal, mandatory Class I areas, which include most large national parks and wilderness areas. No Class I areas are in the vicinity of this project. The PSD program is limited to large sources of emissions. Landfilling is not one

of 28 "named-source" categories (e.g., fossil-fuel-fired steam electric plant) from which emissions of 100 tons per year of an attainment criteria pollutant or precursor would require a PSD review. Other sources, including landfills, require PSD review only if more than 250 tons per year (1,370 pounds per day) of an attainment criteria pollutant will be emitted.

2. A PSD review entails air dispersion modeling designed to assure that emissions and ambient concentrations of attainment pollutants do not exceed prescribed limits. A PSD review by the U.S. Environmental Protection Agency (EPA) is not expected for the Proposed Action because emissions of each attainment pollutant from stationary sources would be less than the triggering rate of 250 tons per year.

1.2.2.3 New Source Performance Standards for Municipal Solid Waste Landfills

1. On May 30, 1991, the EPA proposed a standard of performance for new MSW landfills (Federal Register, 1991b), and guidelines for control of existing landfills. If the final rule is promulgated as proposed, a system would be required to collect and destroy LFG by Best Demonstrated Technology (BDT) for landfills whose construction began after May 30, 1991, and which are large enough to potentially emit over 150 megagrams per year of nonmethane organic compounds (NMOC). BDT would include the requirement of 98 percent destruction of NMOC in collected LFG, and an open flare would be the specified standard destruction device. An alternative destruction specification would require that the outlet NMOC concentration be less than 20 parts per million by volume (ppmv) of dry gas at an oxygen concentration of 3 percent. This alternative is more restrictive, but easier to measure.

2. Compliance monitoring would need to demonstrate the following:
   - The collection and destruction system can handle the maximum expected LFG generation.
   - The pressure is negative at each point where a collection well joins the header system.
   - Measurements of nitrogen concentration show that no excessive air infiltration has occurred.

1.2.3 CALIFORNIA REGULATIONS

1.2.3.1 California Ambient Air Quality Standards and Attainment Status

1. The California Clean Air Act (CCAA) of 1988 established a legal mandate to achieve California Ambient Air Quality Standards (CAAQS) by the earliest practicable date. These standards are

listed in Table 1.1 alongside the NAAQS. The state standards are stricter for O_3, CO, SO_2, and PM_{10}. In addition, California established ambient air quality standards for sulfate, hydrogen sulfide (H_2S), vinyl chloride, and visibility.

2. The California Air Resources Board (CARB) is responsible for enforcing state air pollution regulations. CARB established 41 districts, called air quality management districts (AQMDs) and air pollution control districts (APCDs), to formulate and implement rules and regulations for stationary sources of air pollution. The ICAPCD is the responsible district for all of Imperial County. The SCAQMD's area of responsibility includes the Los Angeles Basin and Riverside County portion of SEDAB.

3. Similar to the federal example, CARB has designated as nonattainment those areas of the state that have exceeded one or more of the CAAQS. The CCAA requires the local districts to develop AQAPs to attain ambient air quality standards. CARB conditionally approved the ICAPCD AQAP for adequacy. The SCAQMD AQAP is directed toward satisfying the federal O_3 standard (by 2010), but would not meet the CAAQS for O_3 by that time. This reality has implications for the attainment of this same standard in downwind air basins.

4. The CCAA recognized that transported emissions and atmospheric chemical reactions affect, and may even dominate, the air quality in downwind air basins. CARB identified SOCAB and the San Joaquin Valley Unified Air Basin as areas of origin for the transport of O_3 and its precursors into Coachella Valley and Imperial County (CARB, 1989a). To fully analyze air quality data and the potential effectiveness of mitigation measures, both transport and local emissions must be accounted for in AQAPs and project Environmental Impact Statements/Environmental Impact Reports (EISs/EIRs).

1.2.3.2 <u>Stationary Source Regulations</u>

1. For the regulation of stationary sources, each district has its own process of reviewing new and modified stationary sources that are proposed for nonattainment areas. The review and a subsequent Permit to Construct require that Best Available Control Technology (BACT) be applied to emitting equipment. In addition, net emissions must decrease. This usually requires a new source to obtain offsets in excess (e.g., 1.2 times) of the proposed emissions based on equations which consider such factors as distance and predominant wind direction between the project and the source of the offset.

1.2.3.3 Mobile Source Regulations

1. CARB also sets California emission standards for some mobile sources, including highway cars and trucks. Concerning locomotives, CARB is authorized by the EPA to require retrofit air pollution control technology and operational changes. Retrofit technology includes retarded ignition timing of the diesel engines in locomotives to reduce combustion temperature and NO_x emissions. This approach decreases fuel efficiency and increased emissions of ROG, CO and PM_{10}. CARB is responsible to require retrofit technology on locomotives over the period 1992 to 1997 according to Measure ARB-16 in the SCAQMD Air Quality Management Plan (AQMP).

1.2.4 IMPERIAL COUNTY AIR POLLUTION CONTROL DISTRICT REGULATIONS

1. The ICAPCD issued its draft AQAP for public comment in February 1992 (ICAPCD, 1992a), and CARB (1993) approved it February 18, 1993, on the condition that ICAPCD furnish additional information. The AQAP proposes over 20 stationary source control measures to reduce local emissions of O_3 precursors.

2. As discussed in Section 2.3.3.3, part of the O_3 in Imperial County and the reason for O_3 exceedances of the state standard is the transport of O_3 and precursors from other areas. A portion of the O_3 in SEDAB is transported from SOCAB, according to CARB (1989a). CARB (1993) back trajectories track SOCAB emissions all the way to Imperial County. The ICAPCD and CARB (1993) believe that Mexicali, Mexico is an important source of the O_3 and precursors transported into Imperial County, and monitored at Calexico-Grant and El Centro.

3. Such transport means that control of O_3 in Imperial County should be coordinated with the control of O_3 in SOCAB and Mexicali. Attainment of the CAAQS for O_3 in Imperial County may have to be delayed from 1994 to beyond 2010 to be consistent with the date when SCAQMD will reduce emissions enough to attain the federal O_3 standard. Even then, the O_3 CAAQS may not be attained in Imperial County if Mexicali sources of O_3 precursors are not sufficiently controlled. Currently, no air pollution control agreement exists between the United States and Mexico, although the proposed North American Free Trade Agreement may lead to an agreement on common environmental objectives and implementation programs.

1.2.4.1 Rule 207 - New and Modified Stationary Source Review

1. Rule 207 requires that a new or modified stationary source emitting at least 137 pounds per day of any nonattainment pollutant or its precursors shall not contribute a net increase in nonattainment emissions. BACT is required for any source which would emit 25 pounds per day or more of any nonattainment pollutant or precursor. BACT is defined by ICAPCD as the most effective emission control device, emission limit, or technique which has been required or used for such class or category of source.

2. Under the related Rule 207.2, (Community Bank and Priority Reserve) a source may obtain its offsets from a Priority Reserve if it is an essential public service. Because an LFG control or processing system is an essential public service under Rule 207.2, and the Proposed Action includes an LFG control system, the Proposed Action can be designated an essential public service in Imperial County. The Applicant has requested SCAQMD to consider this landfill to be an essential public service.

3. Air quality control permits required from the ICAPCD would include:
   - An Authority to Construct (ATC) permit, which would have the following requirements:
     - CAAQS to be met at points of potential public exposure (beyond the fence line).
     - BACT to be used to control site emissions.
     - No net emissions increase from stationary sources for nonattainment pollutants. Offsets would be required when emissions from stationary sources reach the thresholds shown in Table 1.2.
   - Permit to Operate the stationary emission sources.

4. Although not included in ICAPCD Rules and Regulations, ICAPCD has requested that health risk be assessed for the proposed landfill. ICAPCD has no guidelines for health risk assessment; therefore, the well-developed guidelines from the California Air Pollution Control Officers Association (CAPCOA, 1987) and SCAQMD (1992b) will be used. The SCAQMD has a Regulation XIV on toxics, which contains Rule 1401 for the review of new sources of toxic air contaminants.

1.2.5 SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT REGULATIONS

1. SCAQMD is responsible for regulating air quality from stationary sources in the SOCAB and the Riverside County portion of SEDAB. As a result, the SCAQMD has no direct permitting

authority for the proposed landfill in Imperial County. SCAQMD is interested in the proposed project, however, because of the rail-haul of MSW residue out of SOCAB. Rail-haul reduces emissions in SOCAB compared to truck-hauling the same waste to existing and proposed landfills within SOCAB.

2. In 1991, the SCAQMD adopted a Final AQMP which provides for the attainment of all federal, but not state, standards by the year 2010. Because of the implications of that particular year, the 16th year of the Proposed Action, which just follows 2010, is used in this report as one of the analytical years for evaluating air quality effects. By 2010 the effects of O_3 transport from SOCAB to the Coachella Valley and Imperial County should be substantially reduced from present conditions.

3. The AQMP contains 134 measures designed to reduce emissions of O_3 precursors to attain the NAAQS for O_3. Measure No. A-D-1, Out-of-Basin Transport of Biodegradable Solid Waste, would remove landfill emissions from SOCAB. SCAQMD expects to implement this measure in 1997. The Proposed Action would begin implementing the measure earlier. The agencies implementing this measure include SCAQMD, Southern California Association of Governments (SCAG, 1988), and Sanitation Districts of Los Angeles County (SDLAC).

4. SCAQMD provides offsets from its Community Bank or Priority Reserve for essential public services, including LFG collection systems. Although the proposed landfill is located outside SCAQMD, the essential public service of collecting and transporting MSW is conducted within its boundaries and for the benefit of the population within its jurisdiction. Furthermore, the project would carry out an objective of the SCAQMD AQMP and reduce nonattainment criteria pollutant emissions within SOCAB. SCAQMD could declare that the proposed project LFG collection system would be an essential public service, and would be entitled to offsets provided by SCAQMD, if offsets from outside of Imperial County were to be required.

2.0 EXISTING AIR RESOURCES ENVIRONMENT

2.1 GENERAL

1. The existing air resource environment determines if the emissions of air pollutants from a proposed project will have an insignificant impact. The ability of the atmosphere to disperse air pollutants depends on characteristics of the air, which depend on characteristics of the ground and the geographic location being analyzed. Geography/topography and meteorology/climate are major factors in determining the air quality that results from emissions.

2. The two geographic areas related to the proposed regional landfill project in Imperial County are SOCAB and the Salton Trough, which have different geography/topography, meteorology/climate, and air quality. The Salton Trough is within SEDAB, which is defined by the boundaries of Imperial County, the eastern two-thirds of Riverside County, and most of San Bernardino County (except for its southwestern tip which is in SOCAB). This difference between the two geographic areas is important to the potential impact of project-related emissions. Their partial separation by the mountains allows the existence of different air quality, but their connection through Banning Pass allows transport of air and pollutants from SOCAB into Coachella Valley (CARB, 1989a). This connection prevents the Salton Trough from having better air quality.

3. This discussion is divided into two sections. Section 2.2 describes the potentially affected environment in the vicinity of the proposed landfill. Section 2.3 describes conditions in the air basins along the rail-haul route. This information is necessary to: (1) determine air quality effects of the Proposed Action; (2) evaluate the effect of the rail-haul; and (3) provide comparisons of effects with the No Action Alternative, which would result in the disposal of the MSW residue at existing and new landfills in SOCAB.

2.2 PROPOSED PROJECT SITE

2.2.1 GEOGRAPHY/TOPOGRAPHY

1. The proposed landfill is located just south of the Chocolate Mountains and about three miles northeast of the Glamis Beach Store near the SP main line which passes through the Salton Trough (see Figure 1.1). The site is geographically central in the remote portion of eastern Imperial County, almost equidistant from the communities of Yuma (35 miles) in Arizona, and Brawley (35 miles), El Centro (40 miles), Palo Verde (35 miles), and Blythe (60 miles), which are in California.

2. The topography of the site is a slightly inclined outwash of the Chocolate Mountains with eroded desert washes interspersed between older rocky/gravelly alluvial terraces. Vegetation is sparse, covering only about 5 percent of the area, primarily in active wash zones (University of Arizona, 1992).

2.2.2 METEOROLOGY/CLIMATE

1. Since 1989, a surface meteorological station at the Mesquite Mine has monitored wind speed and direction, temperature, relative humidity, precipitation and atmospheric pressure. The location of the station is shown in Figure 2.1 and satisfies EPA (1987) guidelines for siting meteorological stations. One important siting criterion is that a meteorological station should be placed no closer to an obstacle than five times the height of the obstacle. The station is sited a sufficient distance (more than 500 feet) from the leach pads, which are 100 feet above ground.

2. The meteorological data obtained at the Mesquite Mine is used in a dispersion model (ISC2) to calculate potential air quality impacts near the proposed landfill (see Section 6.4.1). Meteorological data were also obtained from El Centro, Imperial Airport, Yuma, and Blythe to investigate the regional wind distribution, and its role in transporting nonattainment pollutants and precursors into the project area. As shown in Table 2.1, during winter the wind direction is most frequently from the north and north-northeast at the site and at Blythe, which is on the Colorado River. This air flow is caused by a high pressure air mass over the southwestern desert region, which pushes air outward. The Chocolate Mountains and other mountains tend to shield Imperial Valley from this flow. This flow causes Santa Ana winds and the strong north-northeast flow at the site in December and January. During spring, the four locations show strong westerly flow. During summer, the monsoon flow from the south appears at the four locations. This flow is from outlying areas towards the summertime thermal low that develops over the desert southwest. During autumn, the southerly monsoon flow shifts back to the wintertime northerly flow as the desert region cools, especially at Blythe and Yuma, which are in the Colorado River Valley.

3. Wind data from the existing Mesquite Mine are illustrated by the annual and seasonal wind roses for the mine shown in Figures 2.2 through 2.6. The one-year period presented in Figure 2.2 and used in the analysis of impacts begins April 1, 1991, and ends March 31, 1992, because monitoring data recovery was highest during those 12 months. Wind monitoring at the

mine started January 11, 1989. Each of the calendar years is dominated by the same north, north-northeast, and west winds, indicating that the chosen period is representative of the four years on record.

4. Potential long-term air quality impacts caused by the Proposed Action will be strongly influenced by the local climatology of the wind. The wind data from the mine are the only information from the region that are representative for the proposed site. The mine data are consistent with long-term weather characteristics for the region, although the nearby Chocolate Mountains have a significant effect on the wind speed and direction.

5. Analysis of the Mesquite Mine wind data indicates that there are generally three distinct characteristics of the wind that occur regularly throughout the year. These are a normal wind pattern, characterized by moderate winds from the west; a wind pattern when Santa Ana conditions are prevalent, characterized by somewhat higher speed winds from the north-northeast; and a wind pattern resulting from the influence of the monsoon season in the Gulf of California and Gulf of Mexico, characterized by light to moderate winds from the south. These three characteristic wind patterns are clearly evident in the 12-month wind rose from the Mesquite Mine, presented in Figure 2.2.

6. The westerly wind pattern is most dominant during the spring (see Figure 2.3), although it also appears in the late fall before the development of the Santa Ana conditions. The wind rose for May 1991 is presented in Figure 2.7 and clearly shows the wind pattern during this westerly flow.

7. The Santa Ana condition is predominant from approximately November through February as shown in Figures 2.5 and 2.6. However, the strong northeasterly winds have appeared at the site as early as August and as late as March. A typical monthly wind rose showing the dominance of the Santa Ana condition is shown in Figure 2.8 for November 1991.

8. The wind pattern characteristic of the summer monsoon season typically occurs in July and August as shown in Figure 2.4. An example monthly wind rose showing the dominance of the monsoon winds in summer is shown in Figure 2.9 for July 1991.

9. The wind data from the Mesquite Mine does not indicate that there is a significant influence of daily heating and cooling cycles on the direction of the wind. However, the wind speed

is observed to increase somewhat during the midafternoon, and the highest percentage of calm conditions occurs between midnight and 6 a.m. This suggests that wind speeds are influenced by diurnal heating and cooling.

10. The annual wind rose for the Mesquite Mine shown in Figure 2.2 can be compared with the 15-year record of wind speed and direction at El Centro shown in Figure 2.10 to demonstrate that the mine data are consistent with the long-term record.

11. The El Centro station (located at the El Centro Naval Air Base) is approximately 50 miles away from the proposed site of the landfill. However, it is the inland station closest to the proposed landfill site for which a long-term record exists. Stations located in Yuma, Arizona, and Blythe, California, are not as representative as El Centro because they are strongly influenced by their location in the Colorado River Valley which channels the wind into only two general components (a northerly component during most of the year, and a southerly component during the monsoon season).

12. The long-term wind rose for El Centro shows the same three characteristic wind patterns as the Mesquite Mine data. There is the normal wind pattern characterized by the strong westerly component, a weak Santa Ana wind pattern which is characterized by a northerly component and an easterly component, and a monsoon wind pattern which is characterized by the southeasterly component.

13. The differences between the annual Mesquite Mine data and the long-term El Centro data are generally due to differences in location, although there are also some differences which are due to peculiarities of the specific year of mine data. The major difference is between the magnitude of the westerly wind component. The westerly winds at El Centro are more dominant. This may be due to the presence or absence of topographic features which can block the air moving from the west, either before it reaches the site or after it passes.

14. The other major difference is in the direction and magnitude of the Santa Ana wind pattern. This difference can be attributed to differences in location and to peculiarities in the specific year of data. The 1991 annual wind rose for Imperial, California (Figure 2.11), which is close to El Centro, is very similar to the long-term average for El Centro, suggesting that the differences between the mine data and the long-term El Centro data are primarily caused by differences in location.

15. To summarize, the wind data collected at the existing Mesquite Mine are the most representative data available to characterize the wind flow patterns at the site. The characteristics of these data are consistent with long-term patterns for the region. The data indicate that there are three characteristic flows for the region: a normal flow occurring primarily during the spring which is characterized by winds from the west; a Santa Ana flow occurring during the winter which is characterized by winds from the north-northeast; and a flow associated with summer monsoons occurring in July and August which is characterized by winds from the south. Transport of air pollutants emitted at the proposed site is expected to follow the direction and timing of these characteristic wind flow patterns.

16. The arithmetic mean annual precipitation at the site for the years 1983 through 1987 and 1991 was 4 inches, and the maximum was 13 inches in 1992. No records of precipitation were kept during 1988 through 1990. Rainfall for the nearest U.S. Weather Bureau stations (El Centro, Blythe and Yuma) indicate that, over long periods, the average rainfall is approximately 3 inches (Gale Research Company, 1978).

2.2.3 EXISTING AIR QUALITY AND ATTAINMENT STATUS

1. The most important air quality parameter at the site is PM_{10} because of the site's close proximity to PM_{10} emission sources, including nearby gravel excavation activities, and operations at the Mesquite Gold Mine, and off-road recreational vehicle driving. PM_{10} emissions in Imperial County and proposed control strategies are described in the Final Draft State Implementation Plan for PM_{10} in the Imperial Valley (E.H. Pechan & Associates, Inc., 1993). Monitoring data for PM_{10} constituent concentrations are being analyzed to determine the relative contribution of different sources to ambient PM_{10} concentrations (Desert Research Institute, 1991). PM_{10} has been measured (24-hour sample) every sixth day at the mine since 1985 to assure adequacy of the mine's extensive dust control program. The four current locations surrounding the mine are shown in Figure 2.1, and satisfy the EPA (1987) guidelines for siting PM_{10} samplers.

2. Table 2.2 contains the 11 days on which at least one PM_{10} observation exceeded the 24-hour CAAQS of 50 micrograms per cubic meter ($\mu g/m^3$) during 1991 (see Table 1.1). The PM_{10} concentrations measured at the four monitors on each day of exceedance are included in Table 2.2, along with prevailing wind direction and speed, and analysis notes. The monitoring indicated the state standard was exceeded in 18 of the approximately 243 readings for that year (61 readings at four stations), although the federal 24-hour standard of 150 $\mu g/m^3$ was never exceeded. These 18 exceedances statistically represent about 27 probable

exceedance days at each of the four monitors (one PM_{10} reading represents six days for a location [18 x 6 ÷ 4 = 27]).

3. Analysis of wind direction and speed indicates that the mine was never the primary cause of those exceedances, although site activities could have contributed to 4 of those 18 readings. Instead, the exceedances generally appear to be due to dust blowing from disturbed desert areas. Gravel excavation to the west of the site is probably affecting the western monitor, labeled as Old Highway 78 West Station in Figure 2.1. The annual geometric mean of each station was less than the annual geometric mean CAAQS of 30 $\mu g/m^3$, as shown in Table 2.3.

4. The data in Table 2.3 provide the information needed to calculate the background PM_{10} ambient air quality concentration for estimating the impact of PM_{10} emissions from the landfill. Expressed in terms of annual arithmetic and geometric concentrations, the two-year (1991 to 1992) background concentrations are 19.9 and 18.1 $\mu g/m^3$, respectively, including the effect of the mine. These background concentrations are used in the modeling calculations discussed in Section 6.4.

5. From May 21, 1992 through May 31, 1993, O_3 and NO_2 were continuously monitored at the water well field located about four miles south of the center of the mine as shown in Figure 2.12. The data are summarized in Table 2.4. The O_3 concentration exceeded the 1-hour CAAQS twice, at 4:00 p.m. Pacific Standard Time (PST) on April 28, 1993 and at 9:00 a.m. (PST) on August 15, 1992, and just reached the standard at 9:00 a.m. (PST) on July 17, 1992. Back trajectories were developed from the mine meteorological data and hourly O_3 monitoring data, and are shown in Figures 2.13 through 2.15 for July 17, 1992, August 15, 1992 and April 28, 1993, respectively. The 1992 trajectories seem to indicate that O_3 and its precursors were present within a few miles of the mine and well field during the previous night. The precursors NO_x and ROG emitted by the mine may have slowly drained downslope toward and beyond the well field during the calm period that developed after sunset on the previous day. Upon sunrise, the air containing these precursors and O_3 remaining from the previous day's O_3 may have moved slowly upslope and crossed the well field at 9:00 a.m., possibly joined by precursors from sources further west, which include trains, agriculture on the east side of Imperial Valley, and the cities in the valley.

6. The April 28, 1993 back trajectory, in contrast, shows downslope flow during the afternoon of the 28th and a dominating west-northwest wind during the early morning hours before sunrise. After sunrise, the upslope winds dominated until late morning. The NO_2 mean concentrations

in Table 2.4 are at the low level expected for uncontaminated remote areas, while the O_3 mean concentrations represent a background level transported into this area (see Section 2.3). The late night occurrence of the NO_2 maximum values in Table 2.4 relate to O_3 chemistry. During sunlight, the atmosphere is well mixed throughout a layer which is 16,000 feet during summer afternoons. NO emitted by heavy equipment exhaust rapidly reacts with O_3 to form NO_2. The NO_2 rapidly photodissociates in the presence of sunlight back to NO and O_3 is formed. When the sun sets, the air nearest the ground cools and stabilizes. Nighttime emissions are not mixed through a deep mixing layer, but instead are caught in the stable surface inversion layer. The NO emissions use available O_3 to form NO_2, but the NO_2 reacts no further. This layer of unreacted NO_2 drains downslope slowly and reaches the well field anywhere from 9:00 p.m. to 2:00 a.m. (see Table 2.4). The next morning, sunlight directly dissociates the NO_2, and the daily cycle repeats.

7. The Mesquite Mine is the only significant source of emissions at or near the proposed site. During the three year period of 1990 through 1992, the actual emissions (in lbs/day) of criteria pollutants were approximately 4,170 of NO_x, 280 of ROG, 1,960 of PM_{10}, 60 of SO_x, and 910 of CO. The ICAPCD inventory contains lower values, including 3,300 lbs/day of NO_x, because they were based on earlier data for fuel consumption and used too high a SO_x emission factor for recent low sulfur fuel (ICAPCD, 1993a).

8. PM_{10} emissions from the mine are currently below the permitted amount and are expected to decline further after about the year 1997, and to stop entirely between 2002 and 2007, as land use activities are completely shifted from mining to landfilling. During the remaining years of operation, other mining emissions (e.g., NO_x, ROG), primarily from mining-related mobile equipment, will also diminish and then cease. The net change in mining and landfilling emissions will be discussed in Chapter 6.0.

2.3 RAIL-HAUL ROUTE

2.3.1 INTRODUCTION

1. The Proposed Action is the construction and operation of a regional landfill, whose existing air resource environment was discussed in Section 2.2. Rail-haul is a project-related activity whose environment extends 216 miles, from the proposed landfill site to the LATC in the

City of Los Angeles. The route, shown in Figure 1.1, passes through Imperial, Riverside, San Bernardino, and Los Angeles counties, and crosses the jurisdictions of ICAPCD and SCAQMD.

2. The air resource environment is divided into the two geographical areas of interest (Salton Trough and SOCAB) and is discussed from an air basin viewpoint. The Salton Trough is further subdivided into Imperial County and Coachella Valley, to reflect areas of separate agency jurisdiction and public interest. The discussion sequence starts with SOCAB, where most of the air pollution from the region originates, then moves to the Coachella Valley and Imperial County areas. The affected environment of each geographical area is different, and therefore, requires separate discussion. As before, each discussion is divided into the same sequence: geography/topography, meteorology/climate, and existing air quality and attainment status.

2.3.2 SOCAB

2.3.2.1 Geography/Topography

1. SOCAB contains approximately 6,600 square miles (SCAQMD, 1991a), and is bounded by the Pacific Ocean on the west, and by mountains on the north and east (see Figure 1.1). Air movement into and out of SOCAB on the north and east sides is particularly constrained by mountains which rise 11,000 feet above its floor, and form a bowl-shaped basin that holds air pollutants.

2. Leakage from this bowl can occur to the south through Orange County toward San Diego, and through a few passes to the east and north. The lowest is the Banning Pass, located at the east end of SOCAB between the San Bernardino and San Jacinto mountain ranges. Banning Pass has an elevation of about 2,200 feet and is the path for smog from SOCAB to be transported into the Coachella Valley and southeastward through the Salton Trough.

2.3.2.2 Meteorology/Climate

1. The meteorology and climate of SOCAB are determined in large part by its position between the ocean on the upwind side within the westerly wind belt, and mountains on the downwind side. The area is usually capped by a semipermanent subtropical high pressure air mass that tends to limit upward mixing.

2. The cool ocean water temperature causes a thin stable layer of air to form over the ocean surface, called the marine layer. Daytime heating causes the land to become warmer than the ocean. The higher temperature over the land causes air to rise and draws air within the thin stable marine layer onshore from the ocean, and under the semipermanent high pressure air mass. This daily sea breeze is intensified in summer when solar heating of the deserts causes a general low pressure to develop east of the mountains that border SOCAB.

3. The major sources of O_3 precursor emissions (ROG and NO_x) are located in the highly-populated coastal area, with its industry, commerce, streets, and freeways. Westerly wind flow causes coastal emissions to affect receptors to the east, where SOCAB's highest O_3 concentrations are recorded. The westerly sea breeze is strongest in summer and in the afternoon. It is usually strong enough in summer to blow right through Banning Pass and carry SOCAB pollution into Coachella Valley. Heating of the upslope to Banning causes the air to more easily rise up and over the pass; this is called the "chimney effect." In winter, the Santa Ana winds from the high pressure air mass over the deserts tend to hold the weaker sea breeze back, and allow less pollution to blow eastward from SOCAB into the Coachella Valley. Under light land and sea breezes in winter, recirculation of pollutants can occur as emissions move westward during the early morning, and eastward during the afternoon. This can cause a buildup of pollutants over several days (ENSR, 1991).

4. Each night radiation is emitted from the earth's surface, causing the air to cool from the ground upward, thereby creating a ground-based inversion. Downslope flow from the surrounding mountains increases the stability of this thin layer. As a result, the mixing height in the SOCAB is only 1,500 to 2,200 feet above the basin floor on summer mornings (Taylor and Marsh, 1991) as shown in Table 2.5. Air pollution emitted by the 13.7 million residents of SOCAB are trapped within this layer, accounting for the high concentrations of pollutants, and, in part, the high intensity of reactions that occur between them to form O_3.

5. Although ground-based inversions form on many nights, especially in the desert, solar heating eliminates most of them the next morning. The resulting mixing layer created from the ground upwards is limited by an elevated inversion. Mean summer morning and afternoon mixing heights in SOCAB are given in Table 2.5, along with those in the Salton Trough for comparison. The lowest mixing heights in SOCAB occur on summer mornings, at the same time that intense sunlight energizes the photochemical reactions of NO_x and ROG emitted by

the millions of commuters. The combination of thin mixing layer, sunshine, large morning emissions of O_3 precursors, and westerly sea breezes accounts for much of the resulting high O_3 concentrations which occur in the eastern basin during the afternoon.

6. An indirect effect of meteorology on air quality relates to LFG whose generation rate depends on the moisture in MSW. Mean annual rainfall in SOCAB ranges from approximately 10 inches in west Riverside County to 36 inches at Big Bear in the San Bernardino Mountains (SCAQMD, 1980). Aliso Canyon (SDLAC, 1990), which is near the No Action Alternative for landfills in SOCAB receives 22 inches. Some of the precipitation leads to infiltration, which contributes to moisture in MSW residue at landfills, and increases LFG generation rates.

7. Evaporation from the surface works in the opposite direction by slightly reducing the moisture in MSW residue before it is buried at the landfill by cover material. The mean annual lake-equivalent evaporation of about 46 inches exceeds the precipitation by a factor of two to three (Kohler, et al., 1959).

2.3.2.3 <u>Existing Air Quality and Attainment Status</u>

1. Air quality in SOCAB is monitored at the 37 stations shown in Figure 2.16, SCAQMD (1988, 1989, 1990b, 1991b, and 1992a). The numerous exceedances in SOCAB are the cause of its nonattainment status for O_3, NO_2, PM_{10}, and CO, which is shown in Table 2.6. SOCAB has been classified as attainment for SO_2. The number and geographical distribution of the nonattainment exceedances in 1990 for O_3, NO_2, PM_{10}, and CO are shown in Figure 2.17.

2. The O_3 exceedances are greater at the east end of SOCAB. NO_x and ROG precursors are emitted more heavily in the west end of SOCAB, but they need two to three hours and sunshine to react and produce O_3. During this reaction period, the precursors and O_3 are transported eastward and collect more precursors. The O_3 "season" extends from February to October/November, with summer having the highest amount of O_3 (CARB, 1987, 1988, 1989b, 1990, and 1991b).

3. The PM_{10} exceedances are also greater at the east end of the basin (see Figure 2.17). A common misinterpretation is that these particles are directly emitted by industrial stacks, vehicle exhausts, and wind-blown dust (called primary particles). Approximately one half of PM_{10} emissions are primary particles emitted directly by such sources (Farber et al., 1989). The remaining half are actually created by gas-phase reactions of PM_{10} precursors (NO_x,

SO_x, and ROG) that produce solid or liquid-phase nitrate, sulfate, and organic compounds, respectively. The significance of this fact is that PM_{10} control strategies in SOCAB must include combustion sources of PM_{10} precursors as well as dust sources.

4. NO_2 and CO exceedances are limited to areas around downtown Los Angeles with high vehicle densities. Significant progress has been made in reducing the frequency of exceedances of both NO_2 and CO as shown in Figure 2.18. However, the same figure shows little reduction in the frequency of O_3 exceedances, despite the huge effort to reduce ROG, the other precursor of O_3, over the last two decades. This figure is based on number of exceedances; therefore, it does not show the progress made in reducing maximum O_3 concentrations, which now rarely reach alert levels.

2.3.3 SALTON TROUGH

2.3.3.1 General

1. The entire Salton Trough, including both the Coachella Valley and most of Imperial County, is one air subbasin affected by the same geographic and meteorological factors. The levels of local emissions, however, are different in the two portions of the trough, as are the sources of pollutants transported into each area. For these reasons, the following description of conditions in the Salton Trough are divided into discussions of the Coachella Valley and Imperial County.

2.3.3.2 Coachella Valley

2.3.3.2.1 Geography/Topography

1. Banning Pass marks the eastern boundary of SOCAB and the western boundary of SEDAB, and restricts the westerly air flow out of SOCAB. The Coachella Valley stretches from Banning Pass eastward, southeastward along Interstate 10 to Indio, and continues southeastward to the north end of the Salton Sea as shown in Figure 1.1. The valley is bounded on the northeast by the Little San Bernardino Mountains, and on the southwest by the San Jacinto Mountains. The elevation drops from 2,200 feet above sea level in Banning Pass to about 230 feet below sea level at Salton Sea. Coachella Valley is topographically shaped like a channel that steers wind and air pollutants from SOCAB over the Salton Sea toward Imperial Valley.

2.3.3.2.2 Meteorology/Climate

1. The restricted air channel in Banning Pass accelerates wind speeds. When the sea breeze moves air out of SOCAB from the west, it descends into Coachella Valley and is compressed

by the higher pressure of the atmosphere at lower elevation. The compressed air is heated and the density increases, which causes the air to descend faster. Figure 2.19 is the wind rose for the SCAQMD air quality monitoring site in Palm Springs during 1986 through 1988 (SCAQMD, 1990a). The direction is highly constrained by the orientation of the valley, and the frequency of high wind speeds exceeds that found in SOCAB or Imperial County. The northwest wind direction is dominant for most of the year except during the summer monsoon season of July and August, when the flow is from the southeast about 20 percent of the time.

2. The position of the valley on the downwind side of the mountains means that clouds and precipitation in the valley are rare. When large low pressure systems, called cyclones, approach the southern California coast, the mountains cause them to rise. The rising air cools, water vapor condenses to form clouds, and precipitation occurs over the area, especially in the mountains. Much of the moisture is extracted from these cyclones by the mountains, causing deserts to form on the east side of the mountains. Precipitation in Coachella Valley is in the range of about 3.4 to 6.3 inches per year (Gale Research Company, 1978). The clear skies and low elevation leads to the high temperatures and naturally low humidity that are characteristic of this valley.

3. The clear skies also lead to strong radiational cooling at night, causing ground-based inversions to form on most nights. Daily upper air soundings taken at Thermal, California, indicate that these frequent ground-based inversions have heights of about 500 to 1,500 feet. The strong solar heating each morning erodes these inversions from the ground up and lead to the mixing layer depths shown in Table 2.5.

2.3.3.2.3 Existing Air Quality and Attainment Status

1. The O_3 exceedances at Banning, Palm Springs and Indio shown in Table 2.7, are the reasons Coachella Valley is classified as nonattainment for O_3 with respect to both NAAQS and CAAQS. These exceedances are caused by transport of O_3 and its precursors from SOCAB through Coachella Valley (SCAQMD, 1992b). Figure 2.20 shows the sequential passage of a daily O_3 front through Banning, Palm Springs, and Indio. Typically, O_3 peaks in SOCAB between noon and mid-afternoon. For example, on August 15, 1992, the O_3 peak in SOCAB was transported eastward and arrived at Banning Pass around 5:00 p.m. Continuing eastward, the peak arrived in Palm Springs about two hours later (7:00 p.m.). Because the distance between these two monitoring stations is about 20 miles, the movement of the O_3 "front" suggests the average wind speed was about 10 miles per hour (mph). SCAQMD wind data

on that date confirms that the air flow was from SOCAB into the Coachella Valley. The peak continued down the valley and arrived in Indio one hour later (8:00 p.m.). Because this distance is also 20 miles, the average wind speed appears to have increased to 20 mph.

2. Exceedances of CAAQS by PM_{10} in the Coachella Valley are shown in Table 2.8. The highest concentrations measured in 1986, 1987, and 1988 exceeded only the CAAQS, while the highest concentrations measured after 1988 also exceeded the NAAQS of 150 $\mu g/m^3$. The area is classified both federal and state nonattainment for PM_{10}. Sources of PM_{10} (SCAQMD, 1990a) include windblown dust (50 percent), construction (30 percent), paved roads (10 percent), and unpaved roads (3 percent). The concentrations are higher at Indio than at Palm Springs probably because of downwind accumulations, and because the soil contains smaller particles further down the valley towards the Salton Sea (SCAQMD, 1990a). Over a long period of time (i.e., decades to centuries), the soil has been size-segregated by blowing wind and deposition so that the larger particles fall out first near the northwest end of the valley and the smaller particles fall out last near the Salton Sea.

3. The PM_{10} nonattainment in the Coachella Valley is serious enough to have merited the development of a special state implementation plan (SCAQMD, 1990a) to help bring the valley into attainment. In addition, SCAQMD adopted Rule 403.1 - Wind Entrainment of Fugitive Dust, which requires cessation or curtailment of local landfill operations, construction, and similar activities that disturb soil when wind speeds exceed 25 mph (SCAQMD, 1992d).

2.3.3.3 Imperial County

2.3.3.3.1 Geography/Topography

1. As shown in Figure 1.1, Imperial County is at the south end of the Salton Trough and, therefore, is affected by transport of pollutants from SOCAB. Also, the city of Mexicali, which is a substantial source of air pollution, is located just across the United States/Mexico border from the Imperial County, city of Calexico. When the wind blows from the south, southeast, or southwest, Mexicali emissions are transported into Imperial County, and affect Imperial County's O_3 exceedances and nonattainment classification, as described later in this section.

2. On the west, Imperial County is separated from San Diego County by mountains, including the Cuyamaca and Laguna Mountains. These mountains remove most of the moisture from the marine air masses so that westerly air reaching Imperial County is dry. As this dry air descends the east side of the mountains, it is compressed and heated, reducing the humidity

further and causing the desert atmosphere. These same mountains are not tall enough to prevent all of San Diego's air pollution from being transported into Imperial County through canyons and passes, including those on Interstate 8 and State Route 94.

3. The eastern and southern borders of Imperial County are relatively flat so that air flow in those directions is unrestricted, allowing local emissions to disperse and move out of the area easily.

2.3.3.3.2 Meteorology/Climate

1. In general, the weather in Imperial County is hot and dry. Only during July and August does the climate become more humid when winds shift into the southeast monsoon pattern. During the monsoon season, the high temperatures throughout the southwestern United States deserts cause a regional-scale low pressure area to draw air from the Gulf of California, which has higher humidity. This monsoon condition also causes Mexicali air pollutant emissions to enter Imperial County in July and August on a regular basis.

2. Meteorology affects precipitation and evaporation, which are key parts of the water balance of the ground or of a landfill. One measure of evaporation is annual lake evaporation, which reaches 86 inches in the SEDAB, the highest amount recorded in the United States (Kohler, et al., 1959; SHB, 1984). The dry air allows constant sunshine except when major air masses occasionally bring in moisture and clouds. Abundant sunshine heats the ground and causes strong convection. The strong convection and associated turbulence erodes ground-based inversions which develop during nights, and deepens the mixed layer. This deep mixed layer is important to dispersing air pollutant emissions. The strong convection can also blow disturbed soil hundreds of feet into the atmosphere.

3. Except for the absence of a channeling effect on wind direction caused by the mountains on either side of the Coachella Valley, the meteorology and climate discussed in Section 2.3.3.2 also applies for Imperial County. The summer mean mixing heights for Imperial County are up to six times deeper than in SOCAB, and therefore, provide better dispersion of air pollutants. During nights, a ground-based inversion may develop as a result of radiational cooling of the ground, but solar heating of the ground the next morning erodes this inversion and creates a mixed layer that deepens to the height of the elevated inversion shown in Table 2.5.

4. Precipitation has been measured at El Centro and Brawley for many years, and averages about 2.5 inches per year (Gale Research Company, 1978). Because of this low precipitation and

high evaporation, LFG generation rates from landfills in this area would be lower than for most other locations. In fact, the precipitation in Imperial County is five to eight times lower than in SOCAB, where landfills would be located in the No Action Alternative.

5. Wind data from the California cities of El Centro, Imperial (Airport), and Blythe; Yuma, Arizona, and the Mesquite Mine from 1989 through 1991 were analyzed. These recent data and previous environmental analyses of the area (St. Clair Research Systems, Inc., 1984; Environmental Solutions, Inc., 1987) indicate the following climatic conditions in Imperial County:

   - The desert environment is very hot and dry in summer, mild in winter, with minimal precipitation (2.5 inches average per year) and very little cloudiness year round.
   - As shown in Table 2.1, during winter the wind direction is usually from the north at the site and at Blythe, which is on the Colorado River. This air flow is caused by a high pressure air mass over the southwestern desert region, which pushes air outward. The Chocolate Mountains and other mountains tend to shield Imperial Valley from this flow. This flow causes Santa Ana winds and the strong north-northeast flow at the site in December and January.
   - During spring, data collected at El Centro, Imperial Airport, Yuma, and Blythe show strong westerly flow.
   - During summer, the monsoon flow from the south appears at each of these four locations. This flow is from outlying areas towards the summertime thermal low that develops over the desert southwest.
   - During fall, the southerly monsoon flow shifts back to the wintertime northerly flow as the desert region cools, especially at Blythe and Yuma, which are in the Colorado River Valley.
   - Sea breezes in SOCAB enter the Coachella Valley at Banning Pass (Figure 1.1) and travel southeasterly through the Salton Trough.
   - Summer weather patterns are frequently dominated by an intense, thermal low pressure area that forms over the heated interior deserts, which creates prevailing winds from the southeast (from the Gulf of California and northern portion of Mexico). This southeast flow meets the northwest flow from SOCAB (Banning Pass) somewhere over the Salton Trough between the northwest end of the Coachella Valley and the Salton Sea.
   - Wind speeds in the region are above levels necessary to promote good mixing so that air mass stagnation does not occur. Winds at night average 5 to 8 mph (weakest in late spring and strongest in winter), while daytime winds average 9 to 13 mph (strongest in winter and early spring, and weakest in fall). Such moderate winds generally carry away locally-generated emissions.
   - Vertical mixing and dilution in the area is very good, with afternoon mixing heights reaching 16,000 feet above ground level in summer. Strong daytime thermal mixing generally disperses nighttime ground-based thermal inversions.

2.3.3.3.3 Existing Air Quality and Attainment Status

1. ICAPCD measures air quality at the six locations listed in Table 2.9 and shown in Figure 2.21. O_3 is measured at El Centro and Calexico-Grant, which are two cities positioned along a north-south line from Mexicali. CARB annually reports exceedances of the CAAQS for O_3 and PM_{10}. During 1991, the one-hour average O_3 concentration exceeded the 90 parts per billion by volume (ppbv) CAAQS for 11 hours during nine days, and the highest concentration was 110 ppbv (see Table 2.10). Similar data for the six most recent years are also shown, and indicate no trend. The exceedances of the O_3 CAAQS shown in Table 2.10 are mild in comparison to those measured in SOCAB (described in Section 2.3.2.3). The highest measured concentrations are only 20 to 30 percent higher than the CAAQS. These O_3 concentrations have not exceeded the NAAQS; therefore, Imperial County is a federal attainment area for O_3. The California nonattainment designation for O_3 means that a new source would have to apply BACT and provide offsets for NO_x and ROG emissions beyond a threshold of 137 pounds per day of each.

2. A daily concentration cycle for an O_3 peak at El Centro for October 9, 1992, is shown in Figure 2.22. This peak was at or near the 90 ppbv standard for four hours between noon and 4:00 p.m. The concentrations before 9:00 a.m. and after 5:00 p.m. were about 20 ppbv, and may be indicative of the background transported into the area from SOCAB, San Diego, and Mexicali. Because the wind was blowing from the southeast quadrant on that day (ICAPCD, 1992b) and the distance of these three potential source areas from El Centro is 200, 90, and 10 miles, respectively, the peak was probably caused by morning vehicular and industrial pollutants from Mexicali. Mexicali has a population of 800,000, while about 120,000 people live in Imperial County.

3. Confirming evidence is provided in Figure 2.22, which shows the O_3 increase occurring about one to three hours earlier at Calexico which is located ten miles south of El Centro on the route to Mexicali. The wind speeds measured at Calexico and El Centro were about 2 to 3 mph, which may have determined the delay.

4. Depending on the wind, the originating NO_x and ROG emissions causing much of the local background may come from SOCAB, Mexicali or San Diego. There are very few local sources of NO_x and ROG in Imperial County that can contribute to either the background concentration or to exceedances. The combination of transport, increasing solar energy in the

morning, and photochemical reactions leads to the noontime peak, after which decreasing solar energy, less photochemical reactions, and continued transport causes the subsequent decrease.

5. The data in Table 2.11 indicate that exceedances at Calexico are more numerous than exceedances at El Centro. The wind direction shown in Table 2.11 for the El Centro exceedances suggest that half of the time the wind was from the southeast quadrant, which implies a possible impact by Mexicali.

6. PM_{10} is measured by ICAPCD at four of the stations listed in Table 2.9, but only two of the stations, Brawley and El Centro, are included in the state annual air quality data reports (CARB, 1987, 1988, 1989b, 1990, 1991b, and 1992a). Exceedances of the 24-hour PM_{10} CAAQS of 50 $\mu g/m^3$ and the highest concentration for each year from 1986 through 1991 are listed in Table 2.12. The standard is exceeded by large margins, apparently because of the combination of high winds over large areas, disturbed by construction, agriculture, and unpaved roads. CARB, EPA, and ICAPCD are cooperatively studying the transport of PM_{10} from Mexicali to El Centro (DRI, 1991).

7. The EPA classified many areas of the nation, including Imperial Valley (see Figure 2.23), as nonattainment for PM_{10} on March 15, 1991 (Federal Register, 1991a). Federal nonattainment resulted because 24-hour PM_{10} concentrations exceeded the 150 $\mu g/m^3$ NAAQS. As shown in Table 2.12 most of the maximum PM_{10} concentrations measured at Brawley and El Centro exceed 150 $\mu g/m^3$. Examination of Figure 2.23 shows that the proposed site is close to the eastern border of the federal PM_{10} nonattainment area and the site PM_{10} concentrations did not exceed the NAAQS (discussed in Section 2.2.3).

8. PM_{10} is emitted directly by sources and is created indirectly in the atmosphere from chemical reactions that convert gaseous precursors into small particles. PM_{10} precursors include NO_x, ROG, and SO_x emissions. NO_x and SO_x are precursor emissions of both attainment and nonattainment pollutants. As such, they are evaluated for both new source review and potential PSD applicability.

9. In July 1991, California classified most of the state, including Imperial County and the rest of SEDAB, nonattainment for O_3 and PM_{10}. Imperial County is unclassified for CO, H_2S, and visibility-reducing particles, and attainment for other criteria pollutants.

10. The attainment status of Imperial County is shown in Table 2.13. In summary:

- The area is state and federal nonattainment for PM_{10}.
- The area is nonattainment for O_3, based on a few exceedances of state standards (CAAQS).
- The area is attainment for NO_2, SO_2, and sulfate, and unclassified for CO, H_2S, and visibility-reducing particles.
- New source emissions of NO_x and SO_x must be evaluated for their effects on both attainment (NO_2 and SO_2) and nonattainment (O_3 and PM_{10}) pollutants.

2.3.3.4 <u>Summary for Rail-Haul Route</u>

1. Table 2.13 summarizes air basin characteristics of SOCAB and Salton Trough, where air quality would be potentially affected by trains hauling the MSW residue to the proposed Mesquite Regional Landfill. Emissions from 1987 are shown because that year was selected as baseline for all district air quality attainment plans throughout the state. The following paragraphs summarize key aspects of each of both areas.

2. General characteristics of the areas show that:

- NO_x and ROG emissions are roughly proportional to population in the various areas. The quantities of these pollutants emitted in SOCAB are much higher than in the desert areas.
- Average annual rainfall in the SOCAB is approximately six times that in Imperial County. This would increase the moisture content of MSW residue and related LFG generation rates for landfills in the SOCAB.
- Most of the land in Imperial County is undeveloped desert, but the desert crust has been disturbed by dirt roads and off-road vehicle use. Coupled with moderate winds, these disturbed areas result in relatively high PM_{10} emissions.

3. Air pollution dispersion characteristics show that:

- Mixing conditions are relatively poor in SOCAB. Transport of pollutants out of the basin is restricted due to the surrounding mountains and an inversion height that is usually below the elevation of the Banning Pass. As a result, nighttime emissions are "trapped" within the basin, and therefore, a higher proportion of the large emissions of NO_x and ROG within SOCAB are photochemically transformed into O_3 in a highly populated area.
- Predominantly westerly wind conditions in SOCAB during the O_3 season transports O_3 and other pollutants through Banning Pass and into Coachella Valley for most of the day. Often in late afternoon, the O_3 peak in SOCAB can be "seen" passing O_3 monitors at Banning, Palm Springs, and Indio.

- Mixing and dispersion is very good in the desert areas. Also, the perimeters of the Salton Trough are topographically distant so that emissions which occur at night can laterally disperse into unpopulated areas of the desert before being exposed to each day's sunlight and converting to O_3. These two characteristics, combined with the relatively low emissions in the trough, limit the amount of O_3 which can be derived from locally emitted NO_x and ROG in the Coachella Valley and Imperial County.
- Wind speeds are highest in the Salton Trough, with large areas of desert containing unpaved roads. These conditions create the potential for high amounts of dust to be naturally generated.

4. The bottom portion of Table 2.13 summarizes the status of air quality conditions within the areas of interest, which are a result of the general and dispersion characteristics described above. SOCAB is nonattainment for each of the key pollutants, although the extent and frequency of NO_2 exceedances is small. The pollutant of most concern is O_3, which had exceedances in the eastern San Bernardino and Riverside portions of SOCAB on 125 days in 1990 (Figure 2.17). The high concentrations, resulting from NO_x and ROG emissions throughout the basin, are transported from SOCAB into the Coachella Valley through Banning Pass. Figure 2.18 shows that O_3 has been the most resistant to reductions due to past controls, and why this pollutant is the primary target of current SCAQMD planning.

5. The Coachella Valley portion of the Salton Trough is classified as nonattainment for PM_{10} and O_3, based on exceedances of the federal standard. The PM_{10} concentrations are relatively high, due to local sources associated primarily with high wind conditions creating dust from construction and disturbed desert areas. Some PM_{10} is also transported from SOCAB. O_3 exceedances in the Coachella Valley are typically the result of transport of this pollutant and its precursors from sources in SOCAB. Local sources of NO_x and ROG do not cause exceedances of either state or federal standards.

6. Imperial County is nonattainment for federal and state standards for PM_{10} and state standards for O_3. The PM_{10} exceedances are caused by a combination of locally-derived dust from disturbed parts of the open desert, dirt roads on agricultural lands, and substantial transport of particulates from Mexicali, Mexico. The small number of moderate O_3 exceedances in Imperial County are partly the result of transport from Mexicali.

3.0 EXISTING ODOR CONDITIONS

1. Although odor is not monitored in Imperial County, nor in other areas of the project analysis, noticeable odors are sometimes evident as a result of livestock operations (e.g., feed lots), agricultural fertilizers, pesticides, and various industrial facilities, such as waste-to-energy facilities, food processing facilities, and geothermal operations. At the proposed site, substantial odors have not been noticed by mine personnel during the period of 1984 to present.

2. Odors are not reported to be a significant existing issue in the Coachella Valley. Odors are sometimes noticeable in areas close to agricultural uses of fertilizers and at some cattle operations.

3. Odors in SOCAB are much more variable than for the desert areas, because of the land use distribution and increased population. Hydrocarbon odors are sometimes noticeable in the vicinity of oil refining and storage facilities, and major highways. Agricultural odors associated with fertilizer application and livestock sometimes occur in undeveloped portions of the basin. Other types of odors may occur locally depending on specific industrial activities.

4.0 EXCHANGE PROPERTIES

1. The properties proposed for exchange between the Applicant and the Bureau of Land Management (BLM) are located in Imperial County and the desert portion of Riverside County as shown in Figure 4.1. These properties have similar weather, climate, air quality, and attainment status to the Salton Trough areas. The main difference is that parcels in the Santa Rosa Mountains National Scenic Area are mountainous, experience more precipitation, and probably have lower PM_{10} concentrations.

5.0 PROJECT ALTERNATIVES

1. Existing air quality conditions and environmental consequences are considered for the following project alternatives:
   - Proposed Action
   - No Action Alternative
   - Onsite Alternatives
     - Alternative I - Smaller landfill footprint (with land exchange for small parcels with Applicant's existing land holdings and a 480-million ton landfill)
     - Alternative II - Reduced daily MSW disposal rate (12,000 tons per day [tpd])
     - Alternative III - Alternative Mesquite Regional Landfill site
     - Alternative IV - Larger landfill project (with landfill covering practically all of the area within Proposed Action boundaries resulting in an 800-million ton landfill and increased daily MSW disposal rate of 30,000 tpd)

2. The Proposed Action configuration is shown in Figure 5.1, and the air quality consequences are described in Chapter 6.0. The following sections describe the alternatives.

5.1 NO ACTION ALTERNATIVE

1. The No Action Alternative would involve the continued disposal of MSW residue from SOCAB to local landfills within SOCAB, located at increasingly greater distances from the population centers. The geography/topography, weather/climate, air quality, and attainment status are the same as presented for SOCAB in Section 2.3.2. Existing conditions in the Coachella Valley and Imperial County would be the same as presented in Section 2.3.3, and the air quality impacts would be primarily associated with the transport of additional O_3 generated in SOCAB for this alternative.

5.2 ONSITE ALTERNATIVE I

1. A smaller landfill footprint is shown in Figure 5.2, and would have a capacity of 480 million tons. The input rate would still increase from 4,000 to 20,000 tpd on the proposed schedule, but the resulting lifetime would decrease from 100 years to about 85 years. This configuration will be used to predict offsite impacts in Chapter 6.0, because the closer boundaries result in higher ambient concentrations than for the Proposed Action configuration.

5.3 ONSITE ALTERNATIVE II

1. The reduced daily MSW disposal rate would be represented by 12,000 tpd. This rate is already proposed to occur for the third year of operation, but would become the maximum rate for the life of the landfill. The landfill equipment and emissions would be less than for the proposed 20,000 tpd input rate, and only three trains per day would be needed to haul 12,000 tpd. The life of the landfill would be extended from 100 years to 165 years.

5.4 ALTERNATIVE III

1. The alternative Mesquite Regional Landfill Site is shown in Figure 5.3, and would be approximately four miles southwest of the proposed site and adjacent to the SP main line.

5.5 ONSITE ALTERNATIVE IV

1. A larger landfill project is shown in Figure 5.4 and would have a capacity of 800 million tons. The input rate would still increase from 4,000 to 20,000 tpd on the proposed schedule, but would increase further to 24,000 tpd in the 14th year, and to 30,000 tpd in the 18th year.

2. The increased daily MSW disposal rate/Alternative IV would be represented by 30,000 tpd. This rate is a 50 percent increase and would require additional heavy-construction equipment and active faces on the landfill. Three more trains per day would be needed to transport an additional 12,000 tpd from LATC to the landfill every other day (three times a week), so that the total number would become eight per day transporting 32,000 tpd of MSW residue. On alternate days, seven trains would transport 28,000 tpd, and hence, the average input would be 30,000 tpd. The lifetime of the landfill would be reduced from 100 years to 73 years, ending in the year 2065 rather than 2094.

6.0 ENVIRONMENTAL ANALYSIS

6.1 INTRODUCTION

1. This chapter is organized to present the underlying assumptions and guidelines for the analysis. A detailed analysis is provided for the Proposed Action, which includes a flare station in early years, and energy recovery in later years. Differences in the analysis of emissions and impacts are described for the following approaches to energy recovery:

   - Boiler/Generator (Electricity)
   - Pipeline-Quality Compressed Methane
   - Liquefied Methane (similar to liquefied natural gas [LNG])

   The different impacts of the energy recovery approaches are compared. The air quality analysis concludes with a program of mitigation measures, and the level of significance after these mitigation measures.

2. The analysis of the environmental impacts of the Proposed Action starts with the assumptions made about sources of air pollutant emissions. Some general assumptions are made about the size and nature of the overall project, and are followed by more specific assumptions about stationary, mobile and fugitive sources, transportation, and odor. Assumptions are also made about measures of significance for air quality impacts.

3. The analysis begins with the identification of proposed sources of air pollutants. Emission characteristics or factors are found in the literature or developed specifically to suit the circumstances for the proposed project. Emissions are estimated from the emission factors and characteristics of the emission device (e.g., stack height, diameter, and gas velocity) to create input information needed for the Industrial Source Complex (ISC2) dispersion model, which is then used to compute ambient air quality concentrations.

4. One year of meteorological data (April 1, 1991 through March 31, 1992) from the Mesquite Mine is used in the dispersion model. The model computes ambient concentrations at specific receptor points for criteria and toxic air pollutants. The latter are used to compute carcinogenic, chronic, and acute health risks.

5. The environmental impacts computed with the model are analyzed relative to measures of significance. Potential cumulative impacts are computed to include those of the Mesquite Mine, which is the only other air quality source of impact requiring a Permit to Operate within 20 miles of the proposed landfill site. Sporadic local sources of air pollution include the

motorcycles, all-terrain vehicles, and four-wheel drive vehicles of recreationists, their campfires, and occasional gravel removal operations southwest of the mine. These sources are considered to be too small and intermittent to quantitatively analyze.

6. Potential cumulative impacts are also evaluated on a larger geographical scale considering that more than one regional landfill might use the same SP main line for transporting MSW residue from the SOCAB. The other potential regional landfills considered are the proposed Eagle Mountain Project in Riverside County and the proposed Chocolate Mountain Project in Imperial County. These projects and the potential cumulative effects are discussed in Section 6.4.3.

7. The project alternatives described in Chapter 5.0 are also analyzed for their impacts relative to the Proposed Action.

8. Finally, mitigation measures are included in the project to reduce environmental impacts.

6.2 ASSUMPTIONS AND ASSESSMENT GUIDELINES

1. The assumptions and assessment guidelines are explicitly described in order to make clear what is being analyzed, under what conditions, and what would constitute a significant impact to air quality. For convenience, the assumptions are classified as follows: general, stationary sources, mobile sources, fugitive sources, transportation, odor, and measures of significance for air quality impacts.

6.2.1 GENERAL

1. Air quality impacts are analyzed for the Proposed Action, which is scheduled to operate for 100 years. Emissions can most reliably be predicted for the early years of operation when air quality control technology can be accurately predicted. Longer term projections (e.g., more than 10 years) become more speculative because air pollution control technology advances, are occurring rapidly, and cannot be predicted. To be conservative, assumptions for the longer period control technologies are based only on currently foreseeable changes in technology and regulatory requirements.

2. The amount of MSW residue is anticipated to increase in steps according to the schedule shown in Table 6.1. Because each successive disposal rate requires an increase in

transportation and landfill activity, the emissions that would be caused by each have been calculated. For each alternative, impacts are calculated for the year of highest emissions, which is the last year.

3. In addition, the 16th year of the Proposed Action is an important year for analysis because: (1) transformation of the land use from the Mesquite Mine to the landfill would have been completed; (2) it is just after an attainment target year in the SCAQMD AQMP; and (3) the landfill would be operating at full capacity. The 100th year is evaluated because LFG generation within the landfill would be greatest, and so would collection and destruction. To be conservative, the Alternative I configuration (Figure 5.2) is used for the maximum likely impacts because the property boundary would be closer to the landfill than would be the boundary for the larger area of the Proposed Action (Figure 5.1).

4. Analysis of the environmental impacts associated with the proposed landfill are put in the context of comparison with the No Action Alternative. Unlike many industrial projects, which add emissions to an existing inventory, the Proposed Action would handle MSW residue differently than that which would otherwise be transported to local landfills within the SOCAB. In the No Action Alternative, trucks would transport all of the MSW residue to new landfills in remote portions of the SOCAB because current landfills that are closer to the most heavily populated areas would already be filled and closed. During the same period of time, when AB 939 will be reducing the generation of MSW residue, increasing population will increase MSW generation. Also, newer landfills will be located further from generators and will lead to increased emissions from the trucks transporting the waste. Further, all of the transportation and landfill-related emissions would occur within the SOCAB. Regardless of the change in the amount of MSW residue generated, the net effect of the No Action Alternative is that emissions of O_3 precursors in SOCAB would be larger than those of the Proposed Action, and more O_3 would be created in SOCAB. The effects of the No Action Alternative in Coachella Valley and Imperial County would include additional O_3 which would be transported through Banning Pass after being generated in the SOCAB.

5. Landfill and transportation impacts on air quality would be controlled by different owners and regulatory authorities. The Applicant for the Proposed Action would control emissions from the landfill based upon appropriate permits obtained from ICAPCD. Transportation emissions from highway trucks, private vehicles, and trains would be determined by equipment manufacturers and suppliers of diesel fuel, in accordance with existing and future federal and state regulations, and technological advances.

6.2.2 STATIONARY SOURCES

1. The Proposed Action would generate LFG from the anaerobic decomposition of MSW residue. The LFG would be collected and destroyed in a stationary facility. The collection system is based on a grid pattern of horizontal wells with overlapping volumes of influence. The overall efficiency of the LFG collection system would be 80 percent. This assumption is conservative compared to the 95 percent collection efficiency assumed for Puente Hills Waste Management Facilities (SDLAC, 1992). The rate of LFG generation has been computed according to the methodology described in Appendix A. The assumptions used in the calculations are listed in Table 6.2.

2. Estimates of emissions from the destruction or recovery of collected LFG are based on the four energy recovery approaches which are included as anticipated project elements. A conservative assumption is that a flare station, with up to three large capacity flares, would be located near the intermodal facility and used for the first 16 years. During this period, flare station NO_x emissions would be less than 1,200 pounds per day, which is 88 percent of the 250-ton per year limit that would trigger a PSD review. The 1,200 pounds per day maximum emission would qualify the Proposed Action for an EPA tentative determination of PSD nonapplicability. NO_2 is the attainment criteria pollutant potentially subject to PSD protection because of NO_x emissions from flares. Flares emit less of other criteria pollutants and their precursors. NO_x, therefore, is subject to analysis both for PSD nonapplicability and for its role as a precursor to O_3, a nonattainment criteria pollutant.

3. LFG contains a variety of organic compounds, depending on the exact composition of the MSW residue and the anaerobic decomposition reaction products. Source tests are used to measure the destruction efficiency of flares. Usually, the concentration of only a few selected compounds are measured before and after a flare to calculate the destruction efficiencies. Pease, et al. (1989) published the destruction efficiencies for six of the most common and most important compounds at the four southern California landfills shown in Table 6.3. The arithmetic mean destruction efficiencies were calculated from source test data and usually exceeded 99 percent except for benzene at Puente Hills and Spadra, and carbon tetrachloride at Puente Hills. The flares are assumed to destroy 99 percent of toxic substances in LFG in this analysis.

4. As soon as it is economically feasible, the energy in LFG methane would be recovered. Energy recovery would be a combination of the following options:
   - A gas turbine, boiler or combined-cycle plant to generate electricity for onsite use and sale through the grid system which presently provides power for the Mesquite Mine.
   - A compressed methane plant to develop commercial quality methane for shipment by pipeline to an existing Southern California Gas pipeline in Niland.
   - A process plant to liquefy the methane (similar to LNG), for sale offsite, or use with onsite equipment or locomotives delivering the MSW residue to the site.

5. The specific combinations of energy recovery would be chosen to suit technology changes and future economic conditions. A boiler burning LFG from "as received" MSW residue is assumed to be the energy recovery approach for Years 85 and 100. The combination chosen provides maximum likely emissions and would not exceed PSD limits. For the analysis of MSW residue conditioned to increase LFG production, energy recovery is assumed to include a boiler/generator and a LNG plant. The emissions and impacts of the assumed energy recovery facilities are presented after the air quality analysis of the Proposed Action.

6.2.3 MOBILE SOURCES

1. Onsite mobile sources include off-road heavy construction equipment. Packer trucks, trains, and private vehicles are discussed separately below in Section 6.2.5 (Transportation) because these mobile sources are used primarily offsite.

6.2.3.1 <u>Off-road Heavy Construction Equipment</u>

1. This equipment includes dozers, compactors, tippers, end-dump trucks, water trucks, graders, loaders, forklifts, container truck tractors, and miscellaneous medium/heavy duty tow and maintenance trucks. The inventory of this equipment for each analyzed year is shown in the emission inventories in Appendix B.

2. The emission factors for each of these vehicle types is provided by EPA (1985) and CARB (1992b). In addition, CARB will impose more stringent NO_x and CO emission factors for off-road heavy-construction equipment in 1996, and in 2000. Because this equipment will be used so intensively, replacements will be procured every few years. New equipment will have improved emissions control and lower emissions as required by the EPA and CARB. This equipment will be inspected and maintained regularly.

3. At the landfill, the fleet of container and service trucks are assumed to be represented by the "Heavy-Duty Diesel Truck" category used by CARB to predict future average emission factors for vehicles in service in California. CARB provides these emission factors for each year up through 2010 and makes them available in a model called E7EPSCF2 (CARB, 1992b). The emission factors are computed at a temperature of 75° F because it is almost identical to the 73° F average temperature of Imperial County listed in Table 2.13.

6.2.4 FUGITIVE SOURCES

1. Fugitive sources include LFG emissions from the surface of the landfill, and fugitive dust emissions. The important sources of fugitive dust emissions include traffic on unpaved and paved roads, heavy construction equipment moving soil, and wind erosion of exposed soil. Evaporation of fuel at the fuel storage area would be a small source of ROG.

2. Fugitive LFG emissions from the surface of the landfill are assumed to result from excess LFG that is not collected in the LFG collection system. As described in Section 6.2.2 above, the overall efficiency of the LFG collection system is assumed to result in 80 percent collection of generated LFG. The remaining 20 percent migrates towards the surface of the landfill. The landfill final cover is expected to prevent this LFG from escaping from the landfill surface or migrating laterally or downward into the soil surrounding the landfill. Although LFG migrating towards the landfill surface would be subject to aerobic decomposition, which converts some methane to harmless water vapor and carbon dioxide, it is conservatively assumed that the full 20 percent of LFG escapes into the atmosphere.

3. BACT would be used on each source of fugitive dust emissions. This evolving technology would include watering unpaved roads, water-flushing and sweeping paved roads, using dust suppressants on disturbed areas that will not be used regularly, and controlling speeds. Speed control would be easier at this landfill than at public landfills because the drivers of almost all vehicles are employees.

4. Frequency of watering would be based on maintaining the darker color caused by moisture in the surface layer. Extensive experience in watering roads has been obtained at the Mesquite Mine. Fugitive dust emissions from the watering trucks are considered negligible because the number of water truck trips would be only 2 percent of the number of trips made by container and cover haul trucks. Further, the water-spray follows momentarily behind the water truck wheels to quickly suppress dust generation.

6.2.5 TRANSPORTATION

1. Transportation would include three types of mobile sources: trains, highway trucks, and private vehicles. Each type is subject to different regulations and technology advances.

6.2.5.1 Trains

1. Transportation emissions would be primarily associated with common carrier trains hauling MSW residue to the proposed landfill. These common carrier trains haul many other products along the same main line, and therefore, are not dedicated to the Proposed Action. ICAPCD Rule 207 excludes these trains from the definition of cargo carriers and from the need for offsets. The distances and route for this analysis are based on the railroad intermodal facility being at the LATC near downtown Los Angeles, and using the SP main line which travels east to Indio and southeast to the proposed site project (see Figure 1.1).

2. As with all emission sources in the SOCAB, there presently is considerable regulatory discussion regarding approaches to reduce train emissions. For example, SCAQMD has set a goal that 90 percent of locomotives in the basin would be electrified by 2010 (SCAQMD, 1991a). Locomotive manufacturers are conducting research and development regarding electrification and other technologies to reduce emissions. Through these efforts, prototype locomotives fueled by LNG are expected to be available for testing in the next few years (General Electric, 1992). Based on these types of efforts, it is anticipated that train locomotive emissions will be reduced substantially during the operating life of the Proposed Action.

3. To be conservative, the air quality analysis assumes that:
   - The current fleet of SP diesel locomotives would be used at the beginning of the Proposed Action.
   - The locomotives used to haul MSW residue by Year 8 would still be mostly diesel-powered, except that NO_x emissions would be reduced 30 percent by improved technology.

   This reduction in NO_x to carry out Measure ARB-16 as discussed in Section 1.2.3 is based on two separate studies performed for CARB (Booze•Allen & Hamilton, 1991; Engine, Fuel and Emissions Engineering [EFEE], 1992) and discussions with locomotive manufacturers (General Electric, 1992) and railroad representatives (Southern Pacific, 1992). Booze•Allen & Hamilton estimates that NO_x emission reductions due to anticipated modifications of existing locomotives will be on the order to 15 to 30 percent. EFEE estimates that NO_x emission reductions due to existing locomotive modifications may be as high as 40 to 50 percent.

Industry and manufacturer representatives estimate 10 to 20 percent reductions. The actual improvement is likely to be that which balances increased rail costs against the use of other transportation modes. It would be counterproductive, and therefore unlikely, for regulations on locomotives to become so restrictive that trucks, which have higher emissions, are used instead of rail. The 30 percent reduction estimate is selected as a reasonable balance based on the projections which currently are available, and the intent of CARB to issue regulations requiring retrofit air pollution controls to reduce NO_x emissions from locomotives.

4. Additional train-related emission assumptions in the analyses include the following:
   - A train will weigh about 3,000 tons with 160 empty containers, and 7,000 tons with the addition of 25 tons of MSW residue in each container.
   - A train will be pulled by four diesel locomotives, each rated at about 3,600 horsepower.
   - Diesel fuel used in these locomotives will have less than 0.05 percent sulfur, the same limit set by the CAA on diesel fuel for trucks and cars to be in effect by October 1, 1993 (Southern Pacific, 1992).

   Special emission estimates are not provided for switching activities at the LATC intermodal facility because the unit train concept eliminates the need for significant amounts of rail car movements once the cars are delivered to the loading facility.

5. Emissions are not calculated for the longer-term possibilities that locomotives will be electrified or powered by LNG. In those instances, emissions would be greatly reduced from those used in this analysis.

6.2.5.2 Highway Trucks

1. The collection trucks (also called packer trucks) that take MSW from homes and businesses (the generators) to transfer stations/MRFs are exactly the same for the Proposed Action and No Action Alternative. Consequently, because the packer trucks will continue to collect MSW from the generators and transport it to a transfer station/MRF, this activity is not part of the Proposed Action and is, therefore, not analyzed. After the transfer stations, the Proposed Action would use specially designed 25-ton capacity containers to haul the MSW residue to the LATC. In the No Action Alternative, a variety of transfer trucks would haul the MSW residue to landfills located within the SOCAB. An average capacity of 20 tons per transfer truck is used for estimating these truck emissions.

2. Emissions are also estimated for the potential 25 transfer trucks which would haul approximately 500 tons per day of Imperial County MSW residue if local communities decide to use the regional landfill. These estimates are also based on 20-ton transfer trucks because in-county transfer stations may not include compactors.

6.2.5.3 Private Vehicles

1. The landfill would employ about 268 people when it operates at its maximum disposal rate of 20,000 tpd. These employees would commute to the site from communities such as Brawley, El Centro, Yuma, Palo Verde, and Blythe at an average speed of 55 miles per hour, the maximum speed limit on Highway 78.

2. Air pollutant emissions associated with employee and supply traffic to the proposed landfill are estimated on the basis of a separate vehicle for every employee, even though current experience at the Mesquite Mine is an average of 1.5 employees per vehicles. This basis over estimates impacts, however, because the actual number of trips along Highway 78 will decrease even more when the existing Mesquite Mine work force of over 300 stop commuting. The difference between the lower emissions from actual carpooling of landfill employees and the higher emissions estimated for the conservative analysis of one vehicle per employee is larger than the emissions from a few goods and services delivery trucks that would arrive each day.

3. The potential air quality effects of idling vehicles due to additional railroad grade crossing delays have been evaluated to determine if this factor could be potentially significant with regard to either air quality conditions at an intersection or as a contribution to overall emissions, especially in SOCAB. These estimates are made using the CALINE 4 model, a temperature of 60° F, 800 vehicles per hour, four lane road, gate blockage time of 2.87 minutes per train, train length of 5,000 feet, and train speed of 30 mph.

6.2.6 ODOR

1. Potential odor impacts would be those associated with emissions:
   - From MSW residue containers during normal train transport.
   - From containers temporarily held in hot desert areas during infrequent railroad delays.
   - At the landfill face.
   - From the container washdown facility.

2. The container used to transport the MSW residue would be vented at one end through a louvered opening. The louvers allow air to enter the container during tipping at the landfill, and thereby, avoid creating a vacuum that could lead to collapse of the container. The containers will have no other openings, though our possible container configuration would use removable tops. These tops would be carefully secured for transport, however, so that with the removable or permanent top configuration no airstream will flow through the containers. However, changes in atmospheric pressure and container temperature as well as MSW residue decomposition will cause some air to vent from the containers. The following five mechanisms will cause venting:

   - Increase in temperature in the container would cause the air to expand.
   - Decrease in external pressure when the train gains elevation at Banning Pass.
   - Diffusion of air from inside the container to the atmosphere.
   - Gas generation caused by aerobic decomposition.
   - Gas generation caused by anaerobic decomposition.

   Each of these mechanisms were analyzed to quantify the relative order of magnitude of the emissions.

3. The train trip is assumed to take ten hours. During that time, the temperature of the MSW residue in the containers is assumed to increase from the 64° F shown in Table 2.13 to 120° F because of solar heating of the container and exothermic decomposition in the MSW residue. The LFG evolved from the MSW residue during transport is assumed to contain 10 ppmv of H_2S as the odorous volatile organic compound (VOC). The odorous H_2S is assumed to leak out of the vent at the end of each container and be diluted by the air displaced by the train as it moves at an average speed of 21.6 mph. The concentration of the odorous H_2S is assumed to decrease by a factor of 10 as it disperses from the wake to the edge of the railroad right-of-way. A maximum-likely train delay would be 24 hours in the hot desert. A maximum-likely time period for containers to reside on the train or ground at the landfill intermodal would be 12 hours.

4. Odors at the landfill face would be controlled by compacting the MSW residue within minutes of dumping from a container and covering the material as soon as practicable (not less than once each day).

5. The containers would be washed once every sixth usage at a washdown facility on the project site. High-pressure water spray would clean residual MSW off the inside walls and carry it to grated drains along the length of the floor. The water would flow through the grates and into a tank, where the water is held for subsequent treatment and reuse. The residual MSW retained

on the grate would be deposited into a covered dumpster, and periodically taken to the active face of the landfill for disposal. The heavily soaked material will not emit appreciable odor before it would be moved to the covered dumpster.

6.2.7 MEASURES OF SIGNIFICANCE OF IMPACTS

1. Significance is defined in order to reach conclusions about calculated ambient air quality concentrations that would be caused by the Proposed Action. Significance measures are different for criteria pollutants, toxic emissions, and odor, and hence, are discussed separately.

6.2.7.1 Criteria Air Pollutants

1. Criteria pollutant air quality impacts resulting from the landfill would be considered potentially significant if the following might occur:
   - Violation of CAAQS, including visibility-reducing particles, or NAAQS, whichever is strictest.
   - Substantial contribution to an existing or projected violation of CAAQS or NAAQS.
   - Increase in the frequency of an existing violation of a CAAQS or NAAQS.
   - Substantial contribution to a delay in attainment of a CAAQS or NAAQS according to a CARB-approved AQAP.
   - Determination that the Proposed Action is inconsistent with a CARB-approved AQAP, including visibility protection.

6.2.7.2 Toxics

1. Toxic compounds can potentially cause three types of health risk: carcinogenic, chronic, and acute. Both carcinogenic and chronic risks are long-term and are based on annual average ambient air quality concentrations, while acute risk is short-term, and based on one-hour average concentrations.

2. A carcinogenic health risk is assumed significant if the probability of toxics causing excess cancer over a lifetime at a receptor site where people reside exceeds 10^{-5}. A chronic or acute risk is assumed significant if the hazard index for either type risk exceeds 1.0 at a receptor site where people reside. The hazard index for all toxic compounds is the sum of the hazard index for each compound, which is the ratio of the ambient concentration of the toxic compound at the receptor divided by the acceptable exposure level (concentration) for that compound.

3. The context for health risk in this analysis is the population available for potential health effects and the guidance provided in EPA (1992), CAPCOA (1992), and SCAQMD (1992c). In this remote project location, the two following situations were assumed to represent potential population exposure:

- Long-term exposure to a permanent population of about 10 people at Glamis, approximately five miles from the center of the landfill (3.1 miles from the southwest corner of the landfill). This situation also covers recreational populations around the sand dunes near Glamis.
- Individuals traveling on Highway 78 exposed for 12 minutes (6 minutes each direction), five days per week for a 40-year period.

A third situation is not realistic, but is included to account for what is allowed in BLM regulations.

- Fourteen days exposure to campers consisting of four individuals located adjacent to the landfill property boundary. This situation covers the recreation public who may be closer than the sand dunes on long weekends and vacations.

6.2.7.3 Odor

1. Odor impacts would be considered potentially significant if effects of the Proposed Action or related rail-haul system were to noticeably change existing conditions at locations where odor could be noticed, including residential, commercial or recreational facilities.

6.3 EMISSION SOURCES

1. The Proposed Action would emit NO_x, ROG, PM_{10}, SO_x, and CO. Emissions are tabulated in detail in Appendix B for the end of the first, second, third, fifth, seventh, eighth, tenth, sixteenth, eighty-fifth, and one-hundredth years. The rate at which MSW residue would be landfilled will increase in increments of 4,000 tpd at the beginning of the first, second, third, seventh and eighth years. The end of the fifth and tenth years represent the five-year planning periods when modeling of air quality impacts will be revised to account for changes in the emission inventory, emission factors, and air pollution control technology. The sixteenth year also has the significance of following the year when SCAQMD reaches its planning horizon in the implementation of their AQMP to control emissions and reach attainment of the O_3 NAAQS. The 85th and 100th years correspond to the end of landfilling for the Alternative I and Proposed Action, respectively.

2. The odd-numbered tables in Appendix B show the emissions from landfilling "as-received" residue. The even-numbered tables show the increased LFG generation and thermal destruction facility emissions if MSW conditioning is used to increase the MSW residue moisture content, methane generation, and energy recovery.

3. The site emissions are shown as a function of time in Figures 6.1 through 6.5, along with the actual and maximum permitted emissions from the Mesquite Mine as references. The maximum permitted emission line ends at the year 2010 because the Mesquite Mine could be a source of emission offsets only during the limited period of time between 1997 and 2010. The total ROG emissions for "conditioned" MSW residue rise much more than the stationary ROG emissions during the latter years because much more LFG is generated. In contrast, the stationary ROG emissions only rise slowly because of the application of the following increasingly effective LFG destruction and treatment technologies:
   - Boiler
   - Liquefied methane plant

4. Figure 6.6 shows estimated methane generation rate for the first 16 years (short-term) and Figure 6.7 shows the rate for 150 years (long-term). The 85th and 100th years have equal emissions in the long-term because LFG generation would reach its asymptotic maximum value as shown in Figure 6.7. Both figures show the rates for "as received" MSW residue and for "conditioned" MSW residue, where the moisture content would be increased to 40 percent on a wet-basis for energy recovery enhancement. Emissions decrease as shown in Figures 6.1 through 6.3, and 6.5 when a boiler generator is used in place of a flare for LFG destruction, because a boiler has lower emission factors as shown in Table 6.4. SO_x emissions increase for Year 85 and 100 in Figure 6.4 because the SO_x emission factor for boilers is higher (see Table 6.4).

5. The emission sources discussion is presented in the following sections:
   - 6.3.1 - Proposed Action
   - 6.3.2 - Project Alternatives

6.3.1 PROPOSED ACTION

1. The Proposed Action and Alternative I (Figures 5.1 and 5.2) have the same emission sources and emissions. While Alternative I would reach its maximum capacity of 480 million tons at about Year 85 (Appendix B, Table B.17), the Proposed Action would continue for another 15 years when it would reach its maximum capacity of 600 million tons (Appendix B, Table B.19). LFG

generation would rise quickly during early years and level off asymptotically to its maximum rate during later years as shown in Figure 6.7. Hence, Years 85/100 are used to estimate the maximum LFG generation rate which could occur. However, the Alternative I configuration is used for comparing modeled ambient air quality concentrations to standards, because that landfill footprint would be closer to the project boundary.

2. The discussion for the Proposed Action is subdivided into the following two sections:
   - 6.3.1.1 - Landfill Site
   - 6.3.1.2 - Related MSW Residue Transport

6.3.1.1 <u>Landfill Site</u>

1. Emission sources directly associated with the proposed regional landfill are described in this section. The three types of sources are mobile, fugitive and stationary. The following activities occur at the landfill upon the arrival of each train with 4,000 tons of MSW residue in 160 containers:
   - Mobile Sources
     - Cranes would unload the containers from the rail cars and place them on container trucks. The container trucks would haul the MSW residue to the active face of the landfill.
     - Dozers, compactors, and other heavy-construction equipment would landfill the MSW residue at the active disposal area, and would load cover material from the existing mine overburden and ore residue piles.
     - Trucks would haul the mine material from the cover withdrawal area to the active disposal area. The material is used to cover the waste with at least 6 inches of at the end of each day.
   - Fugitive Sources
     - Truck wheels lift dust from road surfaces, and wind carries the dust offsite. The use of heavy equipment such as dozers and compactors causes soil to be lifted in working areas at the landfill face and cover material borrow area. Wind erodes the disturbed soil in these working areas and lifts additional particulate matter into the atmosphere.
     - A small amount of the fuel stored onsite would be lost to the atmosphere by evaporation during filling and fueling operations.
     - Approximately 20 percent of the generated LFG is assumed to escape collection and leave the surface as fugitive LFG.
   - Stationary Sources
     - LFG created in the anaerobically decomposing waste would be collected and initially routed to a flare system for destruction. After several years, enough gas would be collected to allow replacing the flare system with an energy recovery system. Several approaches to energy recovery are being evaluated. The boiler/generator alternative is used in this analysis for "as received" residue in the Year 100, when LFG emissions would be highest. If MSW residue is conditioned to

augment LFG generation, then a liquefied methane plant is used together with a boiler/generator to reduce emissions. Each of these stationary source alternatives includes external combustion devices which produce emissions.

2. Figure 6.8 shows the approximate locations for the LFG flare and fugitive LFG emission sources in Year 16 with the more constrained Alternative I configuration. Figure 6.9 shows the fugitive PM_{10} sources for the same year and configuration. Figure 6.10 shows the LFG-fired boiler and fugitive LFG emission sources with the same configuration for Years 85 and 100, which have the same emissions. Figure 6.11 shows the fugitive PM_{10} sources for Years 85 and 100.

3. The square areas in Figures 6.8 and 6.10 represent fugitive LFG emission sources and are smaller as the distance to fenceline receptors decreases in order to satisfy the requirements of the ISC2 model. The fenceline receptors are spaced 250 meters, or about 800 feet apart. The small square points in Figures 6.9 and 6.11 are the volume sources that represent fugitive PM_{10} elevated from the road surface by truck wheels. The spacing between these volume sources can increase as the distance from receptors increases.

4. Table 6.2 summarized the assumptions used to determine the LFG generation rate in Figures 6.6 and 6.7. The methodology used to predict LFG generation rates is presented in Appendix A. LFG generation was determined considering a MSW residue composition that reflects the effects of AB 939 recycling requirements. The moisture content of the components of MSW residue has been taken from (Solid Waste Association of North America [SWANA], 1991).

5. The landfill receives MSW residue in multiples of 4,000 tpd (the capacity of each train). The schedule of each increase in MSW residue acceptance was presented in Table 6.1. The unit methane generation rates shown in Appendix B (Tables B.21 and B.22) are used to compute the total methane and LFG generation rates shown in Tables B.23 and B.24. Tables B.21 and B.23 cover gas generation from "as received" MSW residue, while Tables B.22 and B.24 cover gas generation from "conditioned" MSW residue.

6. Assumptions 4 through 10 (in Table 6.2) are based on the importance of moisture to the anaerobic decomposition of the three organic components in MSW residue. In actual practice, the moisture content would vary with depth in the landfill considering such factors as field capacity with respect to overburden pressures and the timing of landfill height development

(Huitric, et. al., 1979a, 1979b). Optimization of these factors would be determined during pilot testing of moisture enhancement prior to its full-scale implementation. For estimating potential emissions associated with this activity, it is conservatively assumed that the "as received" MSW residue moisture content of 23 percent would be raised to 40 percent for the entire landfill as shown in Appendix B, Table B.24.

7. Table 6.5 summarizes estimated project emissions at Years 16, 85 and 100, assuming that a flare would be used to destroy LFG during Year 16, and a boiler would be used during Years 85 and 100. These estimated emission rates are based on "as received" MSW moisture contents. The emissions are essentially identical for Years 85 and 100 because the LFG generation rate does not increase during that period.

8. Table 6.6 summarizes emissions if the MSW residue is conditioned to augment LFG generation. With MSW residue conditioning, a boiler/generator would be installed before Year 16 to utilize the increased methane for energy generation. Also, a combination boiler/generator and liquefied methane plant would be utilized in the conditioning case to reduce emissions.

9. BACT would be used on stationary sources, and would evolve with the state-of-the-art of air pollution control technology as the landfill grows. Dozers, compactors, trucks, and other heavy equipment would be new machines subject to federally-mandated exhaust emission standards at the time of their purchase. Idling of heavy equipment would be kept to a minimum as a standard procedure, and the equipment would be inspected and maintained regularly. The LFG flare would have a destruction efficiency of at least 99 percent. The unpaved road leading to the landfill construction areas, and disturbed soil areas subject to wind erosion would be sprayed with water or dust suppressants to reduce PM_{10} emissions by 90 percent. One-half of the unpaved road adjoining the paved road would be treated with lignin sulfonate or equivalent dust suppressant to reduce dust by 95 percent. Paved roads would be water flushed to reduce PM_{10} emissions by 75 percent. Diesel trucks and locomotives would use fuel that has less than 0.05 percent sulfur to reduce emissions of sulfur oxides.

10. Fugitive dust emissions would be generated at the landfill as a result of traffic on paved and unpaved roads, from construction operations, from operations at the working face of the landfill, from the handling and transport of landfill cover materials, and as a result of windblown erosion from the cover storage piles and working face of the landfill. Each of these sources of fugitive dust are discussed below along with estimated emissions and mitigation plans to minimize emissions.

6.3.1.1.1 Paved Roads

1. The main paved road is the waste-haul road. This asphalt road would lead from the intermodal facility to the working face. The road would be used as the main thoroughfare for haul trucks transporting the containerized waste from the trains to the working face.

2. The position and length of the paved road would vary over the lifetime of the landfill. The paved road would join an unpaved road that leads to the landfilling operations area at the working face. The road cannot be paved all the way to the working face because trucks hauling the landfill cover must also use the road, and the cover haul trucks would destroy an asphalt road. In addition, the working face would move at such a rate that it would be infeasible to pave all the way.

3. An apron would be constructed at the transition between the paved and unpaved roads. The apron is a design feature that would reduce trackout of dirt and dust from the unpaved to the paved road. The apron would be a paved section of road approximately 150 feet in length that would be cleaned several times a day. Example techniques for cleaning the apron include water flushing and street sweeping/vacuuming.

6.3.1.1.2 Paved Road Emissions

1. Fugitive dust emissions from the paved waste-haul road are calculated on the basis of pounds/vehicle mile traveled (lbs/VMT) using methods presented in EPA (1985). With this methodology, emissions are dependent on the silt content of dust on the road and the dust loading of the road surface. The silt content of the dust is a site-specific value which has been measured. The dust loading is dependent on several factors, and can be estimated using site-specific information and guidance presented in EPA (1985). Silt content of the road dust on existing unpaved roads at the Mesquite Mine has been measured to be approximately 8 percent by weight. This will be assumed to be representative of silt content for dust on the paved roads of the adjacent Proposed Action. To calculate emissions, the dust loading on the surface of the road must be estimated. The dust loading is dependent on the construction and maintenance of the road, the use of the road, and vehicle traffic.

2. The waste-haul road would be a two-lane asphalt road, with each lane being approximately 16 feet wide. Eight-foot wide strips along both shoulders of the road would also be paved. Paved shoulders would reduce emissions by eliminating the potential for trucks to drive off

the paved surface and track on dirt and dust from the shoulders. In addition, the paved shoulders would reduce the amount of dust on the sides of the road that could be blown into the air in the wake of passing trucks.

3. The paved road would be used almost exclusively by the container trucks hauling the waste from the intermodal facility to the working face. Approximately 800 would make this round-trip each day. The high volume of traffic would allow only a brief period for dust to reaccumulate on the road before the passage of another truck. The apron, the wide road, and the type and volume of traffic suggest that the dust loading of the road would be low relative to more typical industrial paved roads. In fact, the most significant source of dust on the road would probably be the deposition of windblown desert dust.

4. EPA (1985) provides a discussion of emissions from industrial paved roads, based on measurements made by Cowherd (1979) and others. Cowherd (1993) indicated that the amount of silt on the landfill paved roads would be expected to be much less than actually measured at iron and steel production plants if trucks were kept from tracking dust from unpaved areas onto the paved road. As a result of this guidance, the lowest silt loading published in EPA (1985), which was 0.09 grams per square meter (gm^{-2}), was divided by three to give an estimated silt loading of 0.03 gm^{-2} (= 9.10^{-4} oz. yd^{-2}) for the landfill paved road before control measures would be applied (e.g., washing). This silt loading is equivalent to 2 pounds per mile. Using the above values, the calculated PM_{10} emission rate from the paved roads is 0.13 lbs/VMT. The assumptions for the paved road from the intermodal facility are summarized in the first part of Table 6.7.

5. Another road would connect the cover-borrow area to the working face. This road would be designed to have two segments: a semipermanent segment which would lead from the cover borrow area to within approximately 750 feet of the working face, and an unpaved segment that continues from the end of the semipermanent segment to the working face. The separation of this road into these two segments is important from the standpoint of maintenance of the roads and for potential dust emissions from the road. The semipermanent segment would be used almost exclusively by the 90-ton (loaded) cover-haul trucks. As mentioned above, a short stretch of the semipermanent segment would be used by both the cover-haul and waste-haul trucks. Because of their weight and the action of their wheels, the cover-haul trucks destroy roads paved with traditional materials such as asphalt. The construction and maintenance of

the semipermanent segment would include application of a pine tar resin which would result in a pavement-like road surface. The assumptions for this pavement-like road from the cover storage area are summarized in the second part of Table 6.7.

6. The unpaved segment would be used by both the cover-haul trucks and the waste-haul trucks. Half of the unpaved segment would be treated with dust suppressants and the other half would be limited to a road watering program. The dust emissions control program for the unpaved roads is discussed further in Section 6.5.

6.3.1.1.3 Unpaved Road Emissions

1. Because the semipermanent segment of road is essentially paved, emissions from this segment have been calculated using the same methodology discussed above for the paved roads. The silt content and dust loading on the semipermanent segment are assumed to be the same as for the waste-haul road discussed above. The semipermanent segment will be two 16-foot wide lanes. The 8-foot wide sections of each shoulder will be treated with the same road surfacing material as the road itself. Aprons will be constructed at the transition between the unpaved and semipermanent segments and at the terminal end of the semipermanent segment at the cover storage area. The semipermanent segment will be cleaned with water flushing.

2. Emissions from the unpaved segment have been calculated using the methods presented in Wyoming (DEQ, 1979) and contained in Appendix B. The Wyoming methodology was chosen instead of the EPA (1985) to be consistent with the approach used to permit the Mesquite Mine and the monitoring experience at the mine. Using this methodology, emissions are dependent on the silt content of the dust on the road, the number of wheels of the trucks, the frequency of precipitation (i.e., the number of days when more than 0.01 inches of rain falls), and the speed of the trucks.

3. The silt content of the dust is the same 8 percent discussed above for the paved road. The cover-haul trucks have 10 wheels, and the waste-haul trucks have 18 wheels. Maximum emissions have been calculated by considering 800 round trips on the road for waste-haul trucks at 20,000 tpd and a variable number of round trips for cover-haul trucks, depending on the amount of cover material needed in different years.

4. The factor dependent on the frequency of precipitation is set equal to one for the calculation of emissions because the emissions control programs will include daily watering. As a result, the uncontrolled emissions are overestimated. However, the control program, discussed in a later section, accounts for the overestimation.

5. The speed of the trucks leaving the active face and driving on the different road segments would vary in the following sequence:
   - 0 mph on the tipper.
   - Accelerate from 0 to 15 mph (average of 10 mph) on the 375-foot long water-treated unpaved segment.
   - Accelerate from 15 to 25 mph (average of 20 mph) on the 375-foot long dust suppressant-treated unpaved segment.
   - Accelerate from 25 to 35 mph on the apron at the end of the paved road, and maintain 35 mph along the paved road to the intermodal facility.

   Trucks arriving at the active face would decelerate in the reverse sequence.

6. Using the above values, the uncontrolled PM_{10} emission rate from the container trucks on the unpaved segment would be 1.76 lbs/VMT for the high-speed part treated with dust suppressant and 0.44 lbs/VMT for the low speed watered part. The uncontrolled PM_{10} emission rate from cover-haul trucks on the unpaved road would be 0.98 and 0.244 lbs/VMT for the high and low speed parts, respectively. The assumptions for the unpaved road at the working face are summarized in the third part of Table 6.7.

6.3.1.1.4 Working Face and Cover-Borrow Area

1. At the cover borrow area, front end loaders remove ore residue from piles and load it into cover-haul trucks. At the active face of the landfill, tippers dump MSW residue from container trucks, dozers spread the MSW residue in 2-foot thick layers, and compactors increase the density of the MSW residue in these layers. It was considered inappropriate to try to describe and quantify the details of these equipment operations in the small unpaved areas adjacent to the active face and ore residue cover-borrow piles. Hence, fugitive dust emissions from operations at the working face and cover-borrow area have been calculated using an emission factor for operation of heavy equipment associated with construction (EPA, 1985). This total dust emission factor is 1.2 tons/acre/month, which is equivalent to about 18 pounds of PM_{10} per acre per day if PM_{10} is assumed to account for 22 percent of these dust emissions (TRC, 1987). The emission rate is dependent on the area of operations. Working face

operations would be limited to approximately 1.14 acres. Cover-borrow operations would be limited to two 0.22-acre areas. The assumptions for construction equipment emissions at the working face and cover borrow area are summarized in the fourth part of Table 6.7.

6.3.1.1.5 Emissions from Wind Erosion

1. Fugitive dust from wind erosion at the cover-borrow area and the working face of the landfill were calculated using methods presented in the EPA (1985). Using this methodology, the emissions from wind erosion depend on the silt content of the surface material, the number of days when precipitation exceeds 0.01 inches, and the fraction of time when the wind exceeds 12 mph. The cover material would be overburden from the Mesquite Mine. The silt content of this overburden has been measured to be 1.6 percent. Just as with the unpaved roads, it is assumed that the frequency of precipitation is zero because the emissions control technology that would be used is daily watering. The reduction in emissions due to a watering program is taken into account as the control efficiency.

2. The fraction of time that the wind exceeds 12 mph was taken into account as part of the air dispersion modeling for the impacts analysis. The modeling was performed using a wind speed dependent emission rate for the wind erosion areas. If the wind speed was less than 12 mph, then the emission rate was set to zero. If the wind speed was greater than 12 mph, then the emission rate from the wind erosion areas was set to the calculated value. This has a negligible effect on the value of the calculated emission rate.

3. Using the above values in the emissions rate equation from EPA (1985), the calculated PM_{10} emission rate is 0.62 lb/day-acre. As with the disturbed area emissions, the emission rate is dependent on the size of the area. The wind erosion area at the working face is estimated to be a single 173m x 173m area (7.4 acres). The wind erosion area in the cover-borrow area is assumed to be three 100m x 100m areas (also 7.4 acres). The assumptions for wind erosion at the working face and cover-borrow area are summarized in the fifth part of Table 6.7.

6.3.1.1.6 Emission Controls

1. Table 6.8 summarizes the individual emission sources included with each major source category. This table also shows the types of controls which would be provided to satisfy:
   - BACT for stationary sources, required by ICAPCD regulations.
   - Commercially available mobile equipment which would be manufactured to satisfy EPA and/or CARB requirements.

2. In general, all feasible and reasonable air pollution control measures have been included in the landfill design. The estimates of control efficiencies for the 100-year period are the same as those used for the 16th year. This is conservative since many additional improvements are expected to occur between the 16th year and the 100th year.

6.3.1.1.7 Construction Emissions

1. Initial construction is a short-term source of emissions that precedes operation. For some projects, initial construction emissions are so large that the resulting ambient concentrations exceed the regular impact of the project after initial construction. Landfills, on the other hand, are ongoing construction projects. For the Proposed Action, initial construction would create less emissions and impact than the normal operation. Initial construction emissions from heavy equipment engine exhaust and fugitive dust are shown in detail in Appendix B (Table B.25), and summarized in Table 6.9 along with comparative emissions from landfill activities in Year 3 at an input of 12,000 tpd of MSW residue (see Table B.5 for detail). Initial construction emissions are not modeled for property boundary concentrations (Section 6.4) because they do not represent worst-case conditions. Ongoing construction emissions are included in the emissions estimates and analysis of impacts of the Proposed Action.

6.3.1.1.8 Emission Offsets

1. While the Proposed Action would result in additional pollutant emissions in Imperial County, other sources nearby would be reducing emissions. The Proposed Action would have an offset program for nonattainment pollutants, which include PM_{10} and its precursors, and ozone and its precursors. The program is discussed below in terms of two offset sources, the Mesquite Mine and agricultural burning.

2. The Mesquite Mine is assumed to operate at its 1991-1993 production level until 1997. Current plans are to start reducing mining operations in 1997, which would begin to create offsets. Agricultural plant material is burned year round in Imperial County, and is a source of emissions that could provide the required offsets for the Proposed Action. The offset would result from gathering the plant material instead of burning it. The plant material would be hauled to the landfill and either used as cover amendment or disposed at an active face.

3. Agricultural burning in Imperial County is a source of PM_{10}, ROG, NO_x and CO. Emissions of SO_x by agricultural burning is insignificant because SO_x emissions are directly proportional to the sulfur content, which is low in most of the burned material. If date palm fonds are burned, some SO_x would be emitted because of the sulfur in this plant.

4. Records of acres and tons of plant material burned in Imperial County are kept by ICAPCD (1993b). Evaluation of these records indicates that the principal materials burned in Imperial County in recent years are wheat straw, the straw and waste from grass crops such as bermuda, sudan, rye, oat and alfalfa, and wastes from the asparagus crop. A record of the total amount of these plant materials burned each quarter from 1985 to 1992 is presented in Figure 6.12.

5. Although burning of these crops varies, each season experiences substantial emissions. Burning of wheat straw is by far the largest contributor to emissions, followed by the other grasses, then asparagus. Burning of wheat occurs principally during the second and third calendar quarters. Grass burning occurs principally during the first quarter, and asparagus burning occurs primarily during the fourth calendar quarter.

6. Emissions of PM_{10}, ROG, and NO_x from burning of wheat, grasses, and asparagus can be calculated using the ICAPCD records and emissions factors presented in EPA (1985). The emission factors for the three crops are listed with the nominal conversion factors to convert tons to acres in Table 6.10. EPA (1985) presents several emission factors for wheat which depend on the method of burning. The wheat straw burning emission factors presented in Table 6.10 are for backfire burning, the method with the lowest emissions among those discussed in EPA (1985).

7. Emissions for each calendar quarter have been calculated using ICAPCD agricultural burning records and Table 6.10. To determine if reducing agricultural burning provides a decrease in emissions sufficient to offset landfill emissions, the historic emissions have been compared with estimated potential landfill emissions. The maximum, minimum, and arithmetic mean emission rates of NO_x, ROG, ozone precursors and PM_{10} for each calendar quarter from the period of 1985 to 1992 are shown by quarter in Figures 6.13 through 6.16, respectively. Comparing these figures with the Proposed Action emissions (e.g., Figures 6.13 and 6.1) indicates that agricultural burning emission reductions would be easily able to provide offsets for the Proposed Action, including an adjustment for the small amount of emissions needed to collect the plant material and transport it to the landfill.

8. Once the mine begins to reduce operations, additional offsets will be available for the Proposed Action. It is assumed that emission of SO_x as a precursor to PM_{10} can be offset along with direct PM_{10} emissions through decreases in PM_{10} emissions from agricultural burning.

9. The landfill emissions would continue to increase during the same period of time when emissions from the adjoining Mesquite Mine will decrease as the economic activity switches from mining to landfilling. The mine is permitted to move a maximum of 40 million tons of ore, protore, and overburden in a year (Environmental Solutions, Inc., 1989). The associated permitted total suspended particulate (TSP) emissions were 1,630 tons per year. The fugitive particulate emissions were approximately 22 percent PM_{10} (TRC, 1987; EPA, 1985) and the particulate in the diesel exhaust of the mobile equipment is considered to be PM_{10}. The other criteria pollutants (NO_x, ROG, SO_x, and CO) are emitted by the mobile equipment at emission rates consistent with the fuel used for heavy equipment and ICAPCD (1993) emission factors. The maximum permitted emission rates are shown as the top horizontal lines in Figures 6.1 through 6.5.

10. The current actual mine emissions are expected to remain constant through 1997 as shown in Figures 6.1 through 6.5. After 1997, the mine emissions are expected to decrease and hence, provide an offset of emissions. The offset would be equivalent to the reduction from the actual historic emissions. For estimating purposes, it is assumed that the decrease in mine emissions will occur linearly to zero in 2007. As illustrated in the figures, the overall mine emission decreases of NO_x and PM_{10} will be greater than corresponding increases in emissions from the Proposed Action and even larger than those from projected stationary sources. For CO, the mine decreases will be larger than the stationary source increases of the Proposed Action. For ROG and SO_x, the Proposed Action stationary emissions will eventually exceed the mine decreases (see Figures 6.2 and 6.4).

11. Because NO_x and ROG are companion precursors, CARB (1993) combines them in producing O_3. The New Source Review Rule 207 allows interpollutant transfers to be approved by the Air Pollution Control Officer. The balance of NO_x and ROG in O_3 formation reactions in Imperial County is not known. Therefore, it is proposed that NO_x and ROG emissions be added as if a unit mass of either has the same effect on O_3 production. This is consistent with the approach used by CARB (1993). Figure 6.17 shows that the sum of NO_x and ROG

emissions associated with the Proposed Action would be less than the decrease resulting from the mine closure. This interpollutant transfer is proposed in addition to an interpollutant transfer between PM_{10} and SO_x which is applied to both sources of offset.

12. The net air emissions would decrease after the Proposed Action reaches its maximum disposal rate and the mine closes. The emissions decrease suggests that air quality would improve. The net emission decreases (site benefit) are shown in Table 6.11. Even with MSW residue conditioning, the net emissions decrease as shown in Table 6.12.

13. The computational details of offsetting landfill stationary point source emissions with reduced mine emissions and agricultural burning, and the generation of excess emission reductions are given in Appendix C. The acquisition of offsets will comply with the requirements of ICAPCD Rule 207, and the disposition of excess emission reductions will comply with ICAPCD Rule 207.1 on emission reduction credit banking.

6.3.1.2 <u>Related MSW Residue Transport</u>

1. The following activities would be associated with the transport of MSW residue from SOCAB to the landfill:
   - At the transfer stations/MRFs, the MSW will be separated into recyclable material categories such as glass, aluminum cans, green waste, tires, etc. The nonrecyclable MSW residue such as food waste will be loaded into containers, each of which will hold 25 tons of waste. The recycling operations would occur at these stations even in the case of the No Action Alternative.
   - Trucks would haul the containers to an intermodal facility at the LATC in downtown Los Angeles, where 160 containers would be loaded on rail cars to create one train holding 4,000 tons of MSW residue.
   - Four locomotives would haul each train east along the SP main line through Banning Pass to Indio, and then southeast along the east side of the Salton Sea to the Proposed Action site, east of Glamis. Five such trains would travel this route each day.

2. The following activities, which would occur whether or not the MSW residue is disposed inside or outside of SOCAB, are not included in the impact analysis:
   - MSW would be collected from residences, commercial businesses, and industry by packer trucks in the same way as it is now.
   - The packer trucks would transport the MSW to combined transfer/ compactor stations in Los Angeles County, much as happens now and will continue through the Proposed Action period.

3. Criteria pollutant emissions from the project-related transportation activities are listed in Appendix B (Tables B.1 through B.20). Truck emissions from the transfer of MSW residue to the intermodal facility are emitted only within the SOCAB, while the emissions from the trains would occur along the entire rail route. The emissions in each geographical area and at the site are shown on four lines at the bottom of Tables B.1 through B.20 in Appendix B.

4. Table 6.13 summarizes estimated emissions associated with transport of MSW residue to the Proposed Action site for maximum input rate of 20,000 tpd. The maximum input rate is expected to be reached in about eight years. The emissions in Table 6.13 include emissions from:
   - Ten train trips per day between the LATC and proposed Mesquite Regional Landfill intermodal facilities (five round trips per day).
   - Transfer trucks hauling waste between transfer stations. The transfer stations are located an average of 16 miles from the LATC.
   - Activities at the LATC to move the containers from these trucks to the trains.

5. Table 6.8 summarizes the control conditions assumed for estimating maximum likely rail and truck transport emissions. As discussed in Section 6.2, it is assumed that the locomotives would continue to use diesel fuel, but the fuel would have a sulfur content less than 0.05 percent. By the eighth year, the emissions of NO_x from the locomotives would be reduced by approximately 30 percent based on improved diesel technology (see Section 6.2.3). Further reductions to emissions from locomotives due to the use of alternative fuels (e.g., LNG) or electrification may occur during the 100-year project life. These types of improvements would reduce the emissions analyzed herein.

6. Additional transport-related emissions are associated with idling of highway vehicles due to delays at rail grade crossings. These emissions are also included in the analysis. Using the total magnitude of these delays estimated by SCAQMD (1988) and CARB (1988) and California idle emission factors, the emissions associated with this delay are estimated to be about 6 lbs/day of NO_x, 7 lbs/day of total organic compounds, and 68 lbs/day of CO. These emissions are inconsequential in comparison to the other transportation-related emissions shown in Table 6.13 for the Proposed Action or for the No Action Alternative emissions discussed in the next section.

7. Table 6.14 provides perspective on project-related MSW transport emissions in SOCAB by showing other emissions within SOCAB of the five criteria pollutants. Emissions from all trains in SOCAB, emissions from the five project-related trains, and total project-related transport emissions in SOCAB (trains, container trucks, and LATC activities) are presented.

The emissions of NO_x from project-related MSW transportation represents the largest potential percentage increase among the emissions of the other pollutants. However, even the NO_x emissions increase is small relative to similar existing emissions in SOCAB.

8. In Imperial County, the net emissions changes that would occur if the mining activity is replaced with the landfilling activity are shown in Tables 6.15 and 6.16 for "as received" and "conditioned" MSW residue, respectively. The decreased mining emissions more than offset the train and landfill emissions in Imperial County. Only the ROG emissions, of the train and landfill, taken alone, exceed the potential decrease in emissions from the curtailment of mining operations.

9. The NO_x and ROG emissions are combined because of their common role as O_3 precursors. It has been assumed that these two components contribute equally to ozone formation so no weighting or scaling factor has been applied to either pollutant emission rate. This is consistent with the approach used by CARB (1993).

6.3.2 PROJECT ALTERNATIVES

6.3.2.1 No Action Alternative

1. For the No Action Alternative, emissions would not occur directly into the Coachella Valley or Imperial County. Instead, the 20,000 tpd of MSW residue would continue to be disposed of in SOCAB landfills, but primarily at more remote sites due to declining space in urban areas. These longer hauls by truck would emit more pollutants within SOCAB, which in turn would affect the downwind areas (e.g., the Coachella Valley and Imperial County) due to pollutant transport (see Section 2.3). This difference would be especially important for ozone because exceedances of Ambient Air Quality Standards (AAQS) for ozone in these downwind areas are primarily due to transport. The current nonattainment status of the Coachella Valley and Imperial County for ozone are mostly due to NO_x and ROG emissions transported into these areas (CARB, 1993).

2. The emissions within SOCAB from transporting and landfilling MSW residue according to the No Action Alternative are presented in Appendix B (Tables B.26 and B.27) for Years 16 and 100. Many of the sources listed in these tables are common to both the Proposed Action and No Action Alternative. For the No Action Alternative, the equipment for landfilling operations is assumed to be the same as for the Proposed Action. The LFG generation rate is higher for the No Action Alternative because the precipitation rate is higher in SOCAB than in Imperial

County, but the same infiltration rate (30 percent) is assumed. More precipitation causes more water to percolate through the soil cover to the MSW residue, resulting in a higher moisture content and LFG generation. The daily emissions for the No Action Alternative at the end of the 100th year (Appendix B, Table B.27) can be compared with the Proposed Action emissions for the same year in Table B.19. The use of trucks for all transportation, rather than a combination of trucks and trains, leads to higher No Action Alternative emissions of NO_x, ROG, PM_{10}, CO, and SO_x.

3. Table 6.17 provides a comparison of emissions in the three areas of interest for both the Proposed Action and No Action Alternative conditions for the 100-year condition. For perspective, these are also compared with the estimated emissions from all sources in these areas in 1987, the base year for air quality attainment plans. The Proposed Action emissions are those discussed in Section 6.3.1 considering the "as received" MSW residue moisture content and using a boiler/generator for LFG destruction. The No Action Alternative estimates are based on the same assumed landfill conditions in SOCAB, except that the MSW residue moisture content is assumed to be proportionally higher because of the additional precipitation (e.g., about 22.5 in/year according to SDLAC (1990) versus 4 in/year at the Proposed Action site as described in Section 2.2.3).

4. The average transfer truck mileage from transfer station/MRFs (at San Pedro, Gardena, Compton, Carson, Southgate, Irwindale, and Vernon) to new landfills in more remote areas of SOCAB (e.g., Sunshine, Elsinore, Chiquita Canyon) is estimated to be 45 miles, compared to 16 miles for the trip from the same transfer station/MRFs to the proposed LATC intermodal facility in downtown Los Angeles. The estimates do not include increased secondary emissions due to the larger traffic impact associated with the longer trips to remote areas of SOCAB.

6.3.2.2 Onsite Alternative I - Smaller Landfill Footprint

1. This alternative would have the configuration shown in Figure 5.2. It is similar to the Proposed Action except that its total capacity would be 480-million tons and its operating life would be about 85 years. As discussed in Section 6.3.1, the emissions for this alternative would be essentially the same as those for the Proposed Action. The Alternative I configuration is used for modeling site-related impacts (Section 6.4.1.1) because the boundary would be closer to the landfill than for the Proposed Action.

6.3.2.3 Onsite Alternative II - Reduced Daily MSW Disposal Rate

1. This alternative would include a reduced average MSW residue disposal rate of 12,000 tpd and an estimated operating life of about 165 years. The emission inventory for this alternative, summarized in Part A of Table 6.18, is lower than for the Proposed Action.

6.3.2.4 Alternative III - Alternative Mesquite Regional Landfill Site

1. This alternative shown in Figure 5.1 would have essentially the same emissions as the Proposed Action.

6.3.2.5 Onsite Alternative IV - Larger Landfill Footprint

1. This alternative would have the larger footprint shown in Figure 5.4, which is capable of holding 800 million tons of MSW residue and an increased average disposal rate of 30,000 tpd. This average rate would result from a combination of seven or eight 4,000 ton trains delivering 28,000 and 32,000 tpd on alternating days. The project life would be shortened to 73 years. Part B of Table 6.18 summarizes the maximum emissions estimated for this alternative. Although these emissions are higher than those of the Proposed Action, the decrease in mine-related emissions would also exceed emissions for this alternative when NO_x and ROG precursors of O_3 are combined, as shown in Table 6.19.

6.3.3 ENERGY RECOVERY OPTIONS

1. As LFG generation rates increase with growth of the landfill and/or through implementation of a full-scale LFG generation enhancement program, it may become economical to utilize the methane fraction of recovered LFG for onsite or commercial energy recovery. The location of the energy recovery plant would be approximately the same as the flare station. This could be accomplished by one or a combination of the following technologies:
    - An LFG turbine (Figure 6.18) or boiler (Figure 6.19) to generate electricity to support power requirements of the landfill and related facilities and/or for sale offsite.
    - A compressed methane plant (Figure 6.20) to develop commercial or pipeline-quality compressed methane from LFG, similar to compressed natural gas (CNG). The methane would be piped to an existing natural gas transmission line located near Niland, California, as shown in Figure 6.21.
    - A system (Figure 6.22) to convert gaseous methane to liquid methane which is similar to LNG. A portion could potentially be used for onsite fuel requirements, and the remainder would be transported offsite by truck or railcar.

2. The emissions associated with flares and boilers have already been discussed in Section 6.3.1. This section evaluates the air containment emissions associated with using all the collected LFG to make either compressed methane or liquefied methane gas.

3. Figure 6.20 shows a schematic diagram for a pipeline-quality compressed methane plant. Contaminants may be emitted to the atmosphere by the following sources:
   - VOC Incinerator No. 1: This device controls the emission of VOCs stripped from condensate which has been separated from the LFG entering the compressed methane plant. This incinerator would be started with natural gas or propane, and fired with some of the compressed methane produced by the plant.
   - VOC Incinerator No. 2: This device controls the emission of VOCs stripped from the cleansing solvent used to remove impurities from the LFG. This incinerator would also be fired with some of the compressed methane produced by the plant.
   - VOC Incinerator No. 3: This device controls the emission of VOCs from the CO_2 adsorber and flash drums, which strip CO_2 and small quantities of VOCs from the cleansing solvent used to remove impurities from the LFG. This incinerator would also be fired with some of the compressed methane produced by the plant.
   - Condensate Tank Vent: This tank would store condensate which has been separated from the LFG entering the compressed methane plant. VOCs vaporized from the condensate would be released uncontrolled to the atmosphere through the tank vent.
   - Compressor Seals: Fugitive VOCs would be emitted from compressor seals and released to the atmosphere.
   - Valves, Flanges, and Fittings: Fugitive VOCs from these devices would be emitted to the atmosphere.

4. Table 6.20 lists the air containment emissions from the compressed methane plant with the LFG collected from landfilling "as received" MSW residue. Emissions associated with the Proposed Action are shown at the bottom of the table for comparison. Table 6.21 provides similar information for "conditioned" MSW residue, in which water, and possibly nutrients, are added to augment anaerobic decomposition and LFG generation.

5. Figure 6.22 shows a schematic diagram for a liquefied methane gas plant. The liquefied methane gas plant is fed with compressed methane gas which has been purified as described above for the compressed methane plant. The liquefied methane gas plant then compresses the gas further prior to production of liquefied methane gas. Therefore, each of the air

contaminant emission sources listed above for the compressed methane plant would be included at a liquefied methane gas plant. In addition, air contaminants would be emitted from the following source:

- CO_2 Vent: Small quantities of CO_2 and VOCs would be released uncontrolled to the atmosphere by the CO_2 separator.

6. Table 6.22 lists the air contaminant emissions from the liquefied methane gas plant for "as received" MSW residue, and Table 6.23 lists the emissions with "conditioned" MSW residue.

6.4 POTENTIAL ENVIRONMENTAL IMPACTS

1. Air quality and odor impacts which would occur due to, or be related to, operation of the Proposed Action are summarized in the following sections:
   - 6.4.1 - Proposed Action Air Quality Impacts
     - 6.4.1.1 - Landfill Site
     - 6.4.1.2 - MSW Residue Transportation-Related Impacts
     - 6.4.1.3 - Consistency with Attainment Plans
   - 6.4.2 - Odor Impacts
   - 6.4.3 - Cumulative Impacts
     - 6.4.3.1 - Mesquite Mine Consideration
     - 6.4.3.2 - Additional Regional Landfills
   - 6.4.4 - Project Alternative Impacts
     - 6.4.4.1 - No Action Alternative
     - 6.4.4.2 - Alternative I - Smaller Landfill Footprint
     - 6.4.4.3 - Alternative II - Reduced Daily MSW Disposal Rate
     - 6.4.4.4 - Alternative III - Alternative Mesquite Regional Landfill Site
     - 6.4.4.5 - Alternative IV - Larger Landfill Footprint

2. The No Action Alternative impacts are initially introduced in Section 6.4.1.2 because it is necessary to compare the potential for continued operation of landfills in the SOCAB area with the Proposed Action to evaluate: (1) the relative importance of potential project-related impacts; and (2) the manner in which compliance with attainment plans would be accomplished.

6.4.1 PROPOSED ACTION AIR QUALITY IMPACTS

6.4.1.1 Landfill Site

6.4.1.1.1 Boundary Concentrations

1. Tables 6.24 and 6.25 summarize the maximum offsite ground level concentrations of NO_2, PM_{10}, SO_2, and CO for "as received" and "conditioned" MSW residue, respectively, where

the property boundary (onsite Alternative I configuration) is closest to the landfill. These concentrations were calculated using EPA's ISC2 model for the Year 16 with a flare station containing three large-capacity flares, and Years 85 and 100 with a boiler-generator.

2. The use of a flare station for Year 16 yields maximum emissions of NO_x, PM_{10}, and CO because flare emission factors are higher than boiler emission factors, except for SO_x, was shown in Table 6.4.

3. Even the estimated concentrations for Year 100 with a boiler are lower than AAQS. The NO_2 and SO_2 estimates are based on the conservative assumption that all of the emitted NO_x and SO_x is in the form of these specific criteria pollutants.

4. Meteorological data for 1991-1992 from the adjacent Mesquite Mine monitoring station and emissions information summarized in Table 6.5 were used for the model. The results show that ambient air quality standards would be met for Years 16, 85 and 100. The estimated maximum concentrations of the gaseous criteria pollutants (NO_2, SO_2, and CO) are almost negligible compared to AAQS.

5. The maximum project concentrations are low enough so that addition of the indicated background concentrations does not cause the total concentrations to exceed AAQS. Even the emissions shown in the bottom half of Table 6.6 for MSW residue conditioning at Year 100 will not cause exceedances of the AAQS. This can be seen by comparing the bottom halves of Tables 6.5 and 6.6. MSW residue conditioning with a boiler/generator and liquefied methane plant would cause emissions changes of -8 percent for NO_x, 0 percent for PM_{10}, -41 percent for SO_x, and +2 percent for CO. Applying the increases to the maximum project concentrations in Table 6.25 does not cause the total concentrations to significantly increase compared to AAQS.

6. Note that for NO_2, the background concentration to use in calculating the annual arithmetic mean total concentration is the annual arithmetic mean measured at the Mesquite Mine well field during the monitoring program conducted from May 1992 through May 1993. For the 1-hour total concentration, the background concentration is the maximum 1-hour concentration measured in the monitoring program.

7. For PM_{10}, the background concentrations to use in calculating the annual arithmetic and geometric mean total concentrations are the annual arithmetic and geometric mean

concentrations measured at the Mesquite Mine during routine monitoring for 1991 and 1992. For the 24-hour total concentration, the background concentration is the same annual arithmetic mean concentration measured at the Mesquite Mine. The annual mean represents background under the full range of wind speeds. It would be inappropriate to add the highest or second highest 24-hour concentration measured in the monitoring program at the mine because these high concentrations can only occur with high wind speed, while the maximum concentration caused by the Proposed Action would be caused by low wind speed (below 2.4 mph).

8. The PM_{10} concentrations decrease quickly with increasing distance from the boundary. For example, the 23.3 $\mu g/m^3$ 24-hour ground-level maximum concentration in Years 85/100 (Table 6.25) decreases 70 percent (to 7.0 $\mu g/m^3$) in 0.6 mile. The site would not produce PM_{10} concentrations high enough relative to the 19.9 $\mu g/m^3$ background over a sufficient distance (at least several miles) and height above ground (hundreds to thousands of feet) to affect visibility relative to its CAAQS (see Table 1.1).

9. Plants and animals are expected to be protected because the total concentrations of the criteria pollutants would not exceed NAAQS secondary standards, which are designed to protect the health of plants and other animals (see Table 1.1).

10. The PM_{10} emissions are below standards because of the planned application of BACT to fugitive dust emissions. Unpaved roads will be frequently watered or treated with dust suppressants on the basis of visual observation of moisture-darkening of the soil, and experience gained at the Mesquite Mine. Each day, paved roads will be water-flushed clean of dust deposits. Exposed areas will be watered or treated with dust suppressants, if needed. The following tiered fugitive dust monitoring and control program would be used to assure that PM_{10} concentrations would not exceed the model estimates.

11. Tier I - Meteorological and Particulate Monitoring Program: The continuous recording meteorological station which measures wind speed and direction, would continue to operate at the Mesquite Mine. When wind speeds exceed 25 mph, landfill operators would be instructed to curtail dust generating activities such as site clearing; stability berm and other dust generating construction; unnecessary vehicle trips; and excavation, hauling (unless covered), and placement of cover material. It may not be feasible to curtail activities associated with placement of daily cover because of permit requirements, but activities associated with intermediate cover would be curtailed until winds subside. Ambient particulate monitoring devices would continue to be operated at their current or new locations approved by ICAPCD.

Particulate and meteorological monitoring data would be reviewed annually to determine whether landfill activities were responsible for causing PM_{10} concentrations higher than model estimates. The actual PM_{10} concentration that would trigger Tier II measures would be developed in consultation with ICAPCD.

12. Tier II - Additional Watering and Use of Dust Suppressants: Watering would be increased to the maximum practical extent that did not cause mud or slippery conditions. If a specific increase in PM_{10} concentration above model estimates, based on consultation with ICAPCD, were to be attributable to the landfill, use of chemical dust suppressants on unpaved roads would be implemented if such suppressants are determined to be effective and practical at the landfill.

13. Tier III - Enhanced Dust Control Measures: If Tier II control measures were not to prevent the specified increases in PM_{10} above model estimates, the Applicant would evaluate for implementation of one or more of the following potential dust control technologies:
    - Application of dust suppressants on identified wind-eroding areas.
    - Installation of temporary and permanent wind breaks along paved roads and around the active face working areas.
    - Alternate methods for application of daily cover material to the active working face.

    Tier III controls would be implemented individually on a case-by-case basis as required by ICAPCD.

6.4.1.1.2 Health Risk

1. Health risk estimates associated with operation of the landfill were calculated for the toxic air contaminant emissions at the 16th, 85th and 100th years with: (1) "as received" MSW residue and "conditioned" MSW residue; (2) 80 percent collection of generated LFG; and (3) a flare or boiler with 99 percent trace gas destruction. The 20 percent of LFG not collected is assumed to escape into the air and its impact is included in this health risk assessment. Although analyzed, the extreme case of living 70 years on the property boundary is not considered to be reasonable because of the remoteness and federal ownership status of the site. Instead, the following three exposure conditions were also analyzed as more reasonable cases:
    - Long-term (70 year) exposure to a population of about 10 residing at Glamis, approximately five miles from the center of the landfill (3.1 miles from the southwest landfill corner). This situation also covers recreation populations around the sand dunes near Glamis.

- Fourteen days exposure to campers consisting of four individuals located adjacent to the landfill property boundary.
- Individuals traveling on Highway 78 exposed for 12 minutes (6 minutes each direction), five days per week for a 40 year period.

2. Table 6.26 summarizes the health risk and indicates that:
   - The maximum carcinogenic risk estimate of 7×10^{-8} is over two orders of magnitude less than the 10^{-5} limit suggested by SCAQMD (1993). This risk of less than 10^{-5} means that if the exposed persons were to breathe this air, the probability that they would get cancer is less than 10 in 1 million. For comparison, the risk of death by all cancers is 10^{-3} (NTS Engineering, 1986).
   - Both the maximum acute and chronic health risk hazard indices (10^{-2} and 9×10^{-3}, respectively) are also two orders of magnitude less than 1.0, the limit suggested by EPA (1992) at which no adverse health effect is expected. Acute health effects are short-term noncancer effects; and hence, the calculation is based on 1-hour mean concentrations. Chronic health effects are long-term noncancer effects, and hence, the calculation is based on annual mean concentrations.

   If the MSW residue were conditioned, the LFG fugitives from the landfill surface would increase by a factor of about 2 (see Appendix B, Tables B.19 and B.20), and the risks shown in the bottom half of Table 6.26 would increase a like amount. The resulting health risks would still be lower than significant levels.

6.4.1.2 <u>MSW Residue Transportation-Related Impacts</u>

1. The following two analyses have been undertaken to evaluate potential impacts of air emissions associated with the transport of MSW residue to the proposed landfill:
   - Evaluation of the effects of transportation-related emissions on air quality in SOCAB, and the Salton Trough. The evaluation for the Salton Trough is treated separately for Coachella Valley and Imperial County.
   - Comparison of NO_2 and CO concentrations with AAQS at rail grade crossings due to the idling of delayed vehicles.

2. In order to evaluate the impacts of transportation-related emissions, it is first necessary to review regional aspects of the existing environment described in Section 2.3. SOCAB is classified as extremely nonattainment for O_3, which is the pollutant emphasized in the 1991 SCAQMD Air Quality Management Plan. The Salton Trough areas, and SEDAB in general, are nonattainment for O_3, although Imperial County's status is related only to state and not federal standards. As discussed in Section 2.3, the nonattainment status in these desert areas is caused by the exceedances of the standard which are due to transport of O_3 from outside of

the area. In Coachella Valley, this transport appears to be entirely from SOCAB. In Imperial County, the transport origin appears to be a combination of Mexicali, Mexico, SOCAB, and possibly San Diego, while local emissions also contribute to the nonattainment.

3. Figure 6.23 illustrates how the reduction in NO_x and ROG emissions in SOCAB would result in O_3 improvements in each of the three areas. Part A of this figure illustrates why NO_x and ROG emissions in SOCAB have a greater impact on air quality than the same emissions in the Coachella Valley and Imperial County. As discussed in Section 2.3, the low inversion layer elevation in SOCAB (often below the elevation of Banning Pass) traps these ozone precursor emissions during the night and early morning. The thin mixing layer provides more opportunity for NO_x, ROG, and other molecules that photochemically form O_3 during sunlight hours. The ground-level concentration of O_3 caused by NO_x and ROG emissions from the two desert areas is less because precursor emissions and O_3 are mixed through the deep desert mixing layer and some of the nighttime O_3-precursor emissions are dispersed before local O_3 creation occurs.

4. Part B of Figure 6.23 illustrates the number of days O_3 state standards are exceeded. The highest exceedance occurs in the basin portions of San Bernardino and Riverside counties, as the pollutants are blown eastward by ocean breezes and are still trapped below the inversion layer before Banning Pass. The exceedances of O_3 east of the pass are primarily the result of leakage which occurs from SOCAB. The exceedances decrease with distance due to dilution and destruction of ozone molecules.

5. Part C of Figure 6.23 shows the changes in NO_x and ROG which would occur as a result of the Proposed Action in Year 100. The most important changes are the decreases that would occur in the SOCAB. Finally, Part D of the figure illustrates how the changes in NO_x and ROG emissions would tend to reduce O_3 concentrations along the entire rail-haul route. The relative improvement would gradually increase toward the east side of SOCAB and then would remain essentially constant within the areas of transport. The dilution effect with distance would affect the magnitude of the transported O_3 and its reduction equally.

6. The added O_3 concentration that would occur in the Coachella Valley due to the NO_x and ROG emissions along the rail line in that area was estimated (see Appendix D) with a simple "box" model, and the results are shown in Table 6.27. These estimates indicate that the average O_3 concentration increase due to the maximum added train activity would be on the order of 1 ppbv. This concentration is much lower than background, and hence, would not

noticeably contribute to exceedances caused by SOCAB transport which frequently reach concentrations of 180 ppbv (see Table 2.7). Also, when conditions in SOCAB are improved so that transport no longer causes exceedances, the additionally derived train emissions in Coachella Valley will not cause local exceedances.

7. A similar analysis for train-related emissions in Imperial County shows comparable or lower O_3 concentrations because the dominant west winds effectively widen the box and transport the lower concentration of O_3 to the eastern low population area. The direct comparison in Imperial County is not as important, however, because of the large reductions in NO_x and ROG emissions which would occur as land use activities at the proposed site are changed from mining to landfilling.

8. Table 6.17 shows that there would be substantial reductions in emissions of each of the other criteria pollutants in SOCAB as a result of the Proposed Action's replacement of existing or new landfills in the basin. This would result in direct improvements for each of the other nonattainment pollutants: NO_2, PM_{10}, and CO. Based on these comparisons and the above O_3 evaluation, it is concluded that air quality effects in SOCAB would be positive (i.e., no significant adverse impacts would occur as a result of the Proposed Action).

9. Table 6.17 shows that there would be increases in the emissions for each of the criteria pollutants in the Coachella Valley as a result of the common carrier trains which would transport MSW residue to the regional landfill. The increases associated with the NO_x, ROG, PM_{10}, SO_x and CO would be 2, 0.04, 0.01 - 0.02, 0.3 and 0.04 percent, respectively, of the 1987 total emissions of these pollutants in that area. The small increase in NO_x emissions would cause an ambient concentration of about 1.6 $\mu g/m^3$ (see Table 6.27) which is much lower than the NO_2 AAQS of 470 $\mu g/m^3$ and background concentration of 39 $\mu g/m^3$. The small increases in NO_x and ROG emissions from trains would not cause the production of significant O_3, as discussed above. The O_3 concentrations which cause exceedances might actually decrease, despite these small local emissions, because the decreases in NO_x and ROG emissions in SOCAB will decrease the O_3 generated in SOCAB and transported into the Coachella Valley.

10. The PM_{10} increase of about 0.1 $\mu g/m^3$ (see Table 6.27) would not substantially affect the time required to reach attainment for that pollutant, in Coachella Valley, where the annual geometric mean concentration was 37 $\mu g/m^3$ in Palm Springs (SCAQMD, 1992a). The 0.07 $\mu g/m^3$ increases of SO_x and 0.5 $\mu g/m^3$ of CO concentrations would be far below the 655 and

23,000 $\mu g/m^3$ AAQS for these attainment pollutants. Based upon these relatively small increases and the anticipated improvement in O_3 transport, the proposed Mesquite Regional Landfill would not result in significant adverse air quality impacts in the Coachella Valley.

11. A similar analysis of the transportation (train) emissions in Imperial County shows them to be 3, 0.1, 0.001, 1, and 0.1 percent of the 1987 baseline inventory of NO_x, ROG, PM_{10}, SO_x, and CO, respectively. These train emissions are a small contribution to the baseline inventory, except for the 3 percent NO_x increase. These increases will cause ambient concentrations similar to those presented above for the Coachella Valley, which are far below AAQS. In addition, the railroad line is located 10 to 30 miles northeast of the communities in Imperial County, and the prevailing wind is from the west. Therefore, NO_x emitted by trains would not noticeably contribute to existing O_3 exceedances in the populated portion of Imperial County. The transition of mining to landfilling during the next 10 to 15 years will reduce NO_x emissions by 4,170 lb/day, more than the project-related transportation emissions of NO_x (1,940 lb/day), and almost equal to the total Proposed Action emissions in Imperial County (4,210 lb/day). Even though the economic activity transition will more than offset the landfill emissions, the Proposed Action includes all air pollution control measures that are feasible and reasonable, as required by the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA).

12. A final rail transportation-related air quality impact consideration is associated with whether idling highway vehicles at a grade crossing delay could cause in exceedances of CAAQS. The intersection at Ramona Avenue (see Table 3-13 of the EIS/EIR) was analyzed for pollutant concentrations because of the large volume of road traffic and relatively slow train speeds at that location. Idling emissions of delayed highway vehicles at this crossing would cause maximum concentrations of 188 and 1,600 $\mu g/m^3$ of NO_2 and CO, respectively. These concentrations are well below the one-hour standards of 470 and 23,000 $\mu g/m^3$, and this effect would not be significant. Mass emissions for NO_2 and CO from idling vehicles at this intersection would be less than the margin of error for measurement of the mass emissions for NO_2 and CO from each passing MSW residue train. These emissions would also not be significant.

13. Employee transportation impact is based on about 268 people commuting from local communities about 90 miles each day. The emissions from their personal vehicles are highest in Year 8 (see Appendix B, Table B.11) when the landfill first reaches its maximum input rate and when their vehicles have the highest emission factors. These vehicle emissions are only 1, 2, 0.1, 0, and 23 percent of the NO_x, ROG, PM_{10}, SO_x, and CO cumulative emissions from

both the project site and related-transport emissions in Imperial County. Further, these emissions occur over rural roads with almost no residences or commerce located between their home communities and the site. Therefore, the impact of these vehicles is negligible, and will decrease beyond Year 8 because of lower emitting vehicles joining the car/light truck population.

6.4.1.3 Consistency With Attainment Plans

1. CEQA requires that the Proposed Action be consistent with AQAPs. The Proposed Action would comply with ICAPCD air pollution control rules and regulations, and is consistent with the Imperial County AQAP.

2. The SCAQMD 1991 AQMP is not directly applicable to the Proposed Action because new source review responsibility and permitting authority reside with ICAPCD. The overall project objective of transporting MSW residue out of SOCAB is consistent with the 1991 AQMP and fulfills AQMP Measure No. A-D-1, Out-of-Basin Transport of Biodegradable Solid Waste (all pollutants). The implementing agencies, SCAQMD, SCAG, and Sanitation Districts of Los Angeles County, proposed an implementation date of 1997. The Proposed Action would implement this measure earlier and begin the process of reducing criteria pollutants and toxics emissions compared to the No Action Alternative emissions which would occur within SOCAB.

3. The SCAQMD AQMP contains two measures aimed at reducing locomotive emissions. Measure ARB-16, Retrofit/Operational Requirements for Locomotive (all pollutants) is proposed for implementation over the period 1992 to 1997. Example retrofit/operational requirements include retarded ignition timing to reduce NO_x emissions and reduced idling time. A 30 percent reduction of NO_x emissions can be achieved by retrofit techniques and is included here in the analysis of Year 16 and Year 100, when maximum emissions are anticipated.

4. SCAQMD AQMP Measure No. 14 is railroad electrification. The implementing agencies are the EPA and the Federal Railroad Administration, and the implementation date for 90 percent electrification is the year 2010. The environmental analysis for the Proposed Action does not assume electrification. If electrification occurs, air quality will improve even more. According to Booze•Allen & Hamilton, Inc. (1991) and EFEE (1992), NO_x emissions after electrification would be about 20 percent of uncontrolled diesel emissions, while the emissions of ROG, PM_{10}, SO_x and CO would be about 30 percent of uncontrolled diesel emissions. Emissions in SOCAB would be reduced even further below those in the No Action Alternative, thereby

decreasing O_3 generation further. As a result, even less O_3 would be transported into the Salton Trough. The rail-haul route in the Salton Trough areas would receive no direct emissions of criteria pollutants, while the site emissions would not change.

6.4.2 ODOR IMPACTS

1. Potential odor impacts would be those associated with:
   - Emissions from MSW residue containers during normal train transport.
   - Emissions from containers temporarily held in hot desert areas during infrequent railroad delays.
   - Emissions at the landfill face.
   - Emissions from the container washdown facility.

2. Each container that will be used to transport the MSW residue would be vented at one end through a louvered opening. The louvers would allow air to enter the container during tipping at the landfill. This would be necessary to avoid collapsing the containers during unloading. No other openings would be present in the containers, hence substantial amounts of air would not be able to flow through the containers. However, changes in atmospheric pressure and container temperature as well as MSW residue decomposition would cause some air to vent from the containers. The following five mechanisms would cause venting:
   - Increases in temperature in the container would cause the air to expand.
   - Decreases in the container internal pressure caused by decreases in external pressure when the train gains elevation.
   - Diffusion of air from inside the container to the atmosphere.
   - Gas generation caused by aerobic decomposition.
   - Gas generation caused by anaerobic decomposition.

   Each of these mechanisms was analyzed to quantify the relative order of magnitude of the emissions. The potential use of containers with removable tops does not change this analysis. A container with a removable top (not a tarpaulin) would be constructed to control odor and LFG with substantially the same level of performance as the permanent containers (May Fabricating Company, 1993).

3. During the normal ten-hour trip from LATC to the landfill, the temperature of the MSW residue may increase from 64° as shown in Table 2.13, to 120° F because of solar heating of the container metal skin and exothermic decomposition reactions. Each container would be 8.5 feet wide, 8.5 feet high, and 40 feet long, and would contain a volume of 2,720 cubic feet (cf). The container would hold 25 tons of MSW residue, which would occupy a volume of about 1,813 cf assuming the MSW residue solids would have a density of 28 pounds per cubic foot (756 pounds per cubic yard). Assuming a porosity of 50 percent, the remaining volume would

be air space and amount to about 1,814 actual cubic feet (acf). Applying the ideal gas law to this air volume as the temperature increases from 64° to 120° F results in an increased volume of about 200 acf, or about 11 percent of the total void air volume of approximately 1,800 acf. This volume increase would escape through the louvered vent during the 10-hour trip, and carry with it 11 percent of the LFG amount calculated below.

4. The MSW residue is just beginning to decompose during the 10-hour trip. During this early period decomposition proceeds mostly by aerobic processes that produce carbon dioxide and water vapor, rather than by anaerobic processes that produce carbon dioxide, methane, and odorous VOCs. For the worst-case assumption that the decomposition is anaerobic, the volume of LFG generated in one container in 10 hours would be about 7.5 acf. This LFG volume would be mixed in the total void air volume in the container, and (774 acf), and add to the 200 acf that escapes because of thermal expansion. Therefore, the total volume that escapes through the louvered opening is about 200 acf, and contains an LFG concentration of approximately 0.4 percent.

5. Although several odorous organic compounds exist in LFG, rotten egg smelling H_2S is assumed to be the dominant compound. It has been measured in LFG at a maximum concentration of 10 ppmv at a southern California landfill (Environmental Solutions, Inc., 1992). H_2S is detected by humans at a concentration of about 700 ppbv (Montgomery, 1985). Assuming the concentration of H_2S in the LFG in the container is the same 10 ppmv measured in the LFG at a landfill, the concentration of the H_2S in the air escaping through the container vent would be about 37 ppbv.

6. As each of the 160 containers would leak out the same 200 acf of expanding air, the train displaces air that turbulently entrains this leaking air and LFG in the train's wake. The train moves at an average speed of 21.6 mph in order to travel 216 miles in 10 hours. While in motion, the train displaces approximately 15 million acf of air per hour while leaking out about 8,200 acf of expanded air and LFG per hour, which dilutes the leaked H_2S concentration by a factor of about 4,650. The resulting H_2S concentration behind the train would be about 8 parts per trillion by volume (pptv).

7. The concentration dilutes further before the wake air disperses off the railroad right-of-way to neighboring property. If this lateral dispersion is assumed to dilute the H_2S concentration by a factor of 10, then the concentration of H_2S at the railroad boundary would be about 0.8 pptv, which is approximately 900,000 times less than the odor threshold.

8. In order to account for the effect of changing external atmospheric pressure, the train climbs from near sea level pressure at the LATC to about 2,200 feet at Banning Pass. The atmospheric pressure for this change drops from about 14.7 pounds per square inch absolute (psia) to about 14.1 psia. Using the ideal gas law, this pressure drop would cause the void space volume to increase by about 4 percent or about 85 acf.

9. If this pressure drop effect were added to the expansion caused by increasing temperature, then the maximum leakage of void space air and LFG from a container would increase from 200 to 300 acf. This would cause the H_2S concentration to decrease because no more LFG is generated during the same time. The final H_2S concentration at the railroad boundary would decrease slightly from 0.8 pptv and would be about 920,000 times less than the odor threshold.

10. If a train were to be delayed for 24 hours in a hot desert environment, the MSW residue could potentially generate about 18 acf of LFG in each container. The concentration of LFG in the air escaping through the vent would increase from 0.4 to about 0.9 percent, and the concentration of H_2S would be potentially 90 ppbv at the vent. This concentration is eight times less than the 700 ppbv odor threshold for humans. Dispersion would reduce the concentration further as distance from the vent increased. As an extra precaution, the Applicant would store a sufficient number of carbon filter covers at the proposed landfill or West Colton rail yard to cover the vents for two train loads of containers. If a delay was expected to exceed 48 hours, these filters would be transported by truck to the site of the delayed train and placed over the container vents. The filters would remove odorous VOCs and still allow venting to occur.

11. The maximum delay for containers to sit on a train or on the ground at the landfill intermodal would be approximately 12 hours. During this time, the MSW residue could potentially generate a maximum of about 9 acf of LFG in each container. The resulting H_2S concentration that could leak out of the vent would be approximately 50 ppbv. This concentration is about 14 times less than the odor threshold. The actual concentration at Highway 78 would be lower because of atmospheric dispersion along the path from the intermodal. If any odor did occur, the carbon filter covers stored at the landfill would be immediately placed over the container vents.

12. Odors at the landfill face would be controlled by compacting the MSW residue within minutes of it being emptied from the containers and covering the material as soon as practicable and not less than once each day. Because of this operating procedure and the remote location, odors at the landfill face are not expected to be noticeable to the public.

13. The containers would be washed at a separate facility. High-pressure water spray would clean residual MSW off the inside walls and carry this material out to grated drains along the length of the floor. The water would flow through the grates and into a holding tank, for subsequent treatment and reuse. The residual MSW retained on the grate would be placed in a covered dumpster, and periodically taken to the active face of the landfill for disposal. This material would be heavily soaked and hence would not emit appreciable odor before it is placed in the covered dumpster.

6.4.3 CUMULATIVE IMPACTS

6.4.3.1 Mesquite Mine Considerations

1. In looking at potential cumulative impacts, other sources of criteria air pollutants in Imperial County were evaluated for their proximity to the project site and the possibility that their contributions to ambient air concentrations might need to be added to those of the Proposed Action. The only stationary source of air emissions within 10 to 20 miles of the Proposed Action is the Mesquite Mine. The mine overlaps the Proposed Action site and operates simultaneously from 1994 to 2007. The mining would decrease while the landfilling increases.

2. The increasing emissions from the Proposed Action and decreasing emissions from the mine were presented in Figures 6.1 through 6.5 for NO_x, ROG, PM_{10}, SO_x, and CO, respectively, and in Figure 6.17 for the combination of NO_x and ROG because they are both O_3 precursors. Cumulative impact can be analyzed on an emissions basis by examining Tables 6.11 and 6.12, which describe the net emissions for Years 85 and 100, with and without MSW residue conditioning. Such emissions reductions mean that cumulative impact on an ambient air quality concentration basis will also be a net decrease (benefit).

6.4.3.2 Additional Regional Landfills

1. Cumulative impact is analyzed here on a regional basis. This analysis is based on the assumption that three regional landfills will be built at the same time, and that each will use 2.5 trains per day to haul 10,000 tpd of MSW residue, and five trains to haul 20,000 tpd. The locations of the three landfills are assumed to be the Proposed Action site, Eagle Mountain Project (EMP) in Riverside County, and Chocolate Mountain Project (CMP) at Niland in Imperial County, shown in Figure 6.24. These three locations are assumed to have the same precipitation of 4 inches per year.

2. Two potential scenarios are considered for the cumulative analyses associated with the simultaneous operation of the three landfills. The most likely scenario is based on reasonable assumptions that can be projected for the next 50 years, and amounts to 30,000 tpd for the three combined landfills. The worst-case scenario considers the improbable potential that all three facilities would operate at their planned combined maximum capacity of 60,000 tpd (20,000 tpd each) some time after 50 years.

3. The emissions for Mesquite Regional Landfill, CMP, and EMP, each at 10,000 tpd, are given in detail in Appendix B, Tables B.34, B.35, and B.36. The emissions for the EMP and CMP at 20,000 tpd each are shown in Appendix B (Tables B.37 and B.38), while the emissions for the Proposed Action at 20,000 tpd have already been presented. A summary of their emissions in each geographic subdivision is shown in Table 6.28 below the emissions associated with the Proposed Action. The emissions of the most likely scenario for the three combined regional landfills in SOCAB and Coachella Valley are simply 1.5 times the emissions of the Proposed Action because 1.5 times more MSW residue (30,000 tpd versus 20,000 tpd) is being hauled along the same SP main line. Similarly, the emissions of the worst-case scenario are three times the emissions of the Proposed Action.

4. The emissions in Imperial County of the most likely scenario for the two landfills located there, the Proposed Action and Chocolate Mountains, are approximately equal to the emissions of the Proposed Action because the same amount of MSW residue (20,000 tons) would be hauled and landfilled each day. The emissions are doubled for the worst-case scenario.

5. For the two scenarios, the other regional landfill, Eagle Mountain, would contribute the emissions shown in Part III of Table 6.28 to Riverside County east of Coachella Valley.

6. The additional reductions in NO_x and ROG in the SOCAB relative to No Action would result in a further reduction in the creation of O_3, which is the key component of smog in that area. There would also be substantial additional reductions in each of the other critical pollutants in SOCAB. Based on these comparisons, it is concluded that air quality effects in SOCAB would be positive as a result of the increased waste-by-rail hauling rates with either scenario, and twice as much benefit for the worst-case scenario.

7. The decrease of O_3 in SOCAB would also result in a reduction of background and peak concentrations (and the potential for exceedances of standards) of O_3 in the Coachella Valley and Imperial County. Table 6.27 showed that there would be small increases of each criteria

pollutants in the Coachella Valley. In comparison with 1987 total emissions of those pollutants in that area, the percentage increases from the most likely 30,000 tpd and 60,000 tpd worst-case scenario would be as shown in Table 6.29.

8. The small increases in NO_x emissions would not cause exceedances of NO_2 AAQS. The small increases in NO_x and ROG emissions from trains could cause an increase in background O_3 on the order of 2 and 4 ppbv for the two scenarios, respectively. The O_3 concentrations which cause exceedances of the standard might actually be less, despite these small local emissions, because of the decrease in O_3 in SOCAB which is transported into Coachella Valley.

9. The CMP and Proposed Action are located about 40 to 60 miles south and southeast of Eagle Mountain, respectively, which is at the south boundary of Joshua Tree National Monument. Because of the intervening mountain ranges and westerly winds, the emissions from CMP and the Proposed Action will not add to the emissions of EMP. This separation is important because EMP emissions may affect Joshua Tree National Monument, a mandatory federal Class I area in PSD regulations.

10. The distance between CMP and the proposed project would be approximately 30 miles, which is sufficient to prevent ambient concentrations from either project adding measurably to ambient concentrations from the other.

11. In summary, the combination of three regional landfills will not cause cumulative effects. The impacts at each site would be similar to each other for the worst-case scenario. For the most likely scenario, the impact would be only one-half the impact presented for the Proposed Action. The impacts along the rail route would be 1.5 and 3 times those for the Proposed Action for the two scenarios, respectively, but still inconsequential as shown by the box model in Appendix D.

6.4.4 PROJECT ALTERNATIVE IMPACTS

6.4.4.1 No Action Alternative

1. The No Action Alternative would result in the 20,000 tpd of MSW residue being transported by transfer trucks to existing and new landfills developed within the SOCAB.
   Sections 6.3.1.2 and 6.4.1.2 discuss how this alternative would cause more emissions of all criteria pollutants in the SOCAB. The increased O_3 in SOCAB, resulting from higher emissions of the precursor pollutants NO_x and ROG, would have a detrimental effect in

SOCAB, Coachella Valley, and Imperial County. Those two desert areas are nonattainment for O_3 mostly because of transport from more populated areas. O_3 created in the SOCAB is the primary cause for exceedances of NAAQS and CAAQS which occur in the Coachella Valley, and a contributor to exceedances of CAAQS in Imperial County.

2. The No Action Alternative would not add new direct emissions in Coachella Valley and Imperial County.

6.4.4.2 Alternative I - Smaller Landfill Footprint

1. The Alternative I landfill would be closer to the project boundaries (see Figure 5.2), with the related potential for higher pollutant concentrations and health risk effects. Because of this difference, the Alternative I configuration was used in this analysis as the conservative basis for calculating maximum impacts for the Proposed Action.

2. The Alternative I configuration could result in additional landfills in SOCAB after the Year 85 with a corresponding reduction in air quality at that time. This additional potential effect is not evaluated, however, because of the speculative nature of predicting waste disposal practices in southern California in 85 years, after the Alternative I landfill would be closed.

6.4.4.3 Alternative II - Reduced Daily MSW Disposal Rate

1. All emissions at the site would be less for this alternative in comparison with the Proposed Action. Therefore all pollutant concentrations at boundaries would be less than standards, and health risks would be even further below measures of significance.

2. Reducing the daily disposal for the Proposed Action would result in greater disposal in SOCAB with a resulting decrease in the air quality improvements than those which would occur because of the Proposed Action. This also would reduce the improvements to O_3 transport which result in exceedances in the Salton Trough area of SEDAB.

3. Train emissions directly into the Salton Trough areas would be reduced. This would cause a reduction in the small effects of these local emissions as a result of the Proposed Action (see Section 6.4.1.2).

6.4.4.4 Alternative III - Alternative Mesquite Regional Landfill Site

1. This Alternative would have the same emissions as shown for the Proposed Action.

6.4.4.5 Alternative IV - Larger Landfill Footprint

1. Most air quality aspects of the 73-year, 800-million-ton Alternative IV landfill would be similar to those for the 100 year, 600-million ton Proposed Action. The maximum operating emissions would be identical and both the maximum fugitive and collected LFG would be nearly the same.

2. The primary air quality impact differences between this Alternative and the Proposed Action include:

   - Onsite MSW residue handling and disposal activities would increase by an average of 50 percent, and by 60 percent on the alternate days when eight trains had MSW residue to the landfill. This would result in a 60 percent increase in pollutant emissions due to onsite fuels and construction activities, unless additional controls were to be implemented.
   - Train and container truck traffic and transfer activities at the LATC intermodal facility would also increase by an average 50 percent, and by a maximum of 60 percent.

   Application of the model in Appendix A for this case indicates a maximum LFG generating rate 50 percent higher than for the Proposed Action because LFG generation is a long-term process that does not respond to the daily differences between landfilling 28,000 and 32,000 tpd.

3. Due to an expected increase in the PM_{10} emissions resulting from the increased activity, additional dust control measures would be implemented, including increased road flushing and container truck wheel washing, if necessary. This will result in the paved road control efficiency increasing from 75 percent to 80 percent.

4. The Alternative IV landfill footprint shown in Figure 5.4 would be as close to the property line as for the Proposed Action (see Figure 5.1), but would stay close along more of its perimeter.

5. To roughly approximate the boundary pollutant concentrations estimated for this alternative and compare them to the NAASQ and CAAQS, the maximum project concentrations in Table 6.25 were increased by 60 percent. As shown in Table 6.30, it is not anticipated that standards would be exceeded.

6. The increased input rate would increase the following three sources of health risk toxics: fugitive LFG, LFG destruction device exhaust, and heavy construction equipment exhaust. These increases increase the health risks in long-term and 14-day exposure cases (Table 6.26) by a factor of about 1.5, but which remain below acceptable levels.

7. For the health risk exposure of the 12-minute daily driver, more of the larger footprint of Alternative IV would be close to the highway, as can be seen in Figure 5.4. The area of the footprint would be expanded from that shown in Figure 5.1 to include the area between the east side of the landfill and Highway 78, and between the south side of the landfill and Highway 78. It is estimated that the same rate of release of fugitive LFG would increase health risk to a traveler in a vehicle no more than a factor of ten. Such an increase would not cause the health risks in Table 6.26 to reach the measures of significance for toxics (see Section 6.2.5.2).

8. Long-term stationary source emissions at the site for Alternative IV would be less than the reduction that will occur when mining is curtailed. Therefore, the combination of offsite offsets from agricultural waste burning diversion and decreased mining would also be adequate for this alternative.

9. Increasing the daily MSW residue disposal rate of the Proposed Action would further reduce the amount of MSW residue landfilling required in SOCAB. Based on the discussion in Section 6.4.1.2 related to the No Action Alternative it can be concluded that Alternative III would also further improve air quality in SOCAB. This improvement would also assist in reducing O_3 exceedances in Coachella Valley, which are caused by transport from SOCAB. The reduced transport from SOCAB would also reduce the O_3 background in Imperial County.

10. Local emissions due to train traffic in the Salton Trough areas would increase by 50 percent on average, and by 60 percent on the alternate days with eight trains. These would result in 4.5, 0.15, 0.005, 1.5 and 0.15 percent increases in NO_x, ROG, PM_{10}, SO_x and CO emissions in Imperial County, respectively, and 3, 0.06, 0.03, 0.45, and 0.06 percent increases in Coachella Valley, respectively The small increase in NO_x would not cause exceedances of NO_2 AAQS. The increases in NO_x and ROG could potentially increase background O_3 conditions in the Coachella Valley by about 2 ppbv (see Section 6.4.1.2). These concentrations would not noticeably contribute to exceedances caused by SOCAB transport which frequently reach concentrations of 180 ppb. Also, when conditions in SOCAB are improved so that transport no longer causes exceedances, the additionally derived train emissions in Coachella Valley are not expected to cause local exceedances. This is because

other local emissions of NO_x and ROG probably cannot create enough O_3 so that adding the 2 ppbv from the trains could cause the sum to reach the CAAQS of 90 ppbv.

6.4.5 IMPACTS OF ENERGY RECOVERY OPTIONS

1. Based on the comparison of compressed methane plant emissions with Proposed Action emissions, as summarized in Tables 6.20 and 6.21, it is likely that implementation of the compressed methane option for energy recovery would result in the following:
   - NO_x and SO_x impacts associated with the compressed methane plant option are expected to be lower than the Proposed Action. Downwind impact of CO, PM_{10} and ROG associated with this option are expected to be similar to the Proposed Action. Emission of ozone precursors would be considerably lower for the compressed methane option.
   - Health risk impacts associated with the compressed methane plant option are expected to be similar to the Proposed Action.

2. Based on the comparison of liquefied methane gas plant emissions with Proposed Action emissions, as summarized in Tables 6.22 and 6.23, it is likely that implementation of the liquefied methane gas plant option for energy recovery would result in the following:
   - NO_x and SO_x impacts associated with the liquefied methane gas plant option are expected to be lower than the Proposed Action. Downwind impacts of CO, PM_{10}, and ROG associated with this option are expected to be similar to the Proposed Action. Emission of ozone precursors would be considerably lower for the liquefied methane gas option.
   - Health risk impacts associated with the liquefied methane gas plant are expected to be similar to the Proposed Action.

6.5 MITIGATION MEASURES

6.5.1 INCORPORATED BY DESIGN

6.5.1.1 Fugitive Dust

1. Air quality and odor mitigation measures would be incorporated into the landfill design, construction and operation. PM_{10} monitoring stations and an onsite meteorological station would be installed and operated as agreed upon with the ICAPCD. This monitoring would be an integral part of the following fugitive dust mitigation program.

2. Fugitive dust emissions from paved roads would be controlled by constructing two-lane roads with wide paved shoulders, and constructing an apron at the transition between the paved and unpaved roads.

3. In addition to the design features presented above, a street cleaning program would be implemented consisting of flushing the paved road with water once or twice a per week. The water would be applied either by truck or by a roadside sprinkler system. The frequency of flushing would depend on ambient conditions. During particularly windy periods, or if an excessive amount of dust were to accumulate on the road, the frequency would be increased.

4. The apron, which can be considered as part of the paved road, would be cleaned more frequently. The apron would be flushed with water once daily or more frequently during periods when excessive trackout is observed. The apron would also be swept or vacuumed between water flushing should this prove to be a feasible method for reducing dust loading associated with trackout. According to EPA (1985), a water flushing program such as the one described above provides a dust emission control efficiency of 50 percent. A higher efficiency of 75 percent is planned through the use of higher flushing frequencies.

5. Fugitive dust emissions from unpaved roads would be controlled using separate strategies. As with the paved roads, the design features of the semipermanent unpaved segment would assist in reducing emissions. Dust-suppressing stabilizers such as resins would be used during the construction of the road. Roads constructed in such a manner have essentially all the qualities of a paved road. Therefore, as with the paved road, the best alternatives to further reduce emissions are alternatives which reduce the surface loading of dust. Weekly water flushing would be used with periodic reapplication of resin material to achieve an overall control efficiency of 75 percent when the emissions rate is estimated based on paved road emissions.

6. If the selected road base material is not resistant to water flushing, the road would be maintained per the manufacturer's recommendations. As an alternative to weekly water flushing, periodic watering of the road (once or twice per day) or more frequent reapplication of road base material may be used.

7. For the impermanent segment of the road, the selected control strategy is watering of the road for the low-speed segment, and use of dust suppressant on the high speed portion. Additional treatment may include the resin-type stabilizers or other dust-suppressing treatments such as lignin sulfonate.

8. The road watering program would entail frequent application throughout the day, with the exact frequency dependent on specific conditions such as previous weather, temperature, humidity,

etc. This type of control program would provide a dust control efficiency of 90 percent (EPA, 1985). The additional treatment of the high speed segment would achieve an overall control efficiency of 95 percent.

9. Fugitive dust emissions from the operations areas of the working face and the cover-borrow areas would be controlled using a combined strategy of limiting the area of operations and by using traditional dust-suppression techniques such as area watering.

10. A three-tier contingency program would be used if the above mitigation measures were not adequate. Tier I is the meteorological and particulate monitoring program. In addition to using the dust control measures described above, wind speed and direction would be continuously measured. Ambient particulate monitoring devices would be installed at points upwind and downwind of the landfill and approved by ICAPCD. Particulate and meteorological monitoring data would be reviewed annually to determine whether landfill activities were responsible for elevated PM_{10} levels with respect to background air quality as represented by the upwind monitoring device.

11. Detection of PM_{10} concentrations higher than modeled estimates would trigger Tier II measures. The PM_{10} concentration increase that would trigger Tier II measures would be determined in consultation with ICAPCD. The Tier II part of the program would include additional watering or use of chemical dust suppressants. Watering would be increased to the maximum feasible extent.

12. If Tier II control measures were to be ineffective in controlling increases in PM_{10} concentrations, one or more of the following Tier III potential dust control technologies would be evaluated for implementation:

    - Application of dust suppressants on wind-eroding areas.
    - Installation of temporary and permanent wind breaks along paved roads and around the active face working areas.
    - Alternate methods for application of daily cover material to the active working face.
    - Surfacing of selected unpaved roads with gravel, crushed rock, or asphalt.

    Tier III controls would be implemented individually on a case-by-case basis.

6.5.1.2 Stationary Sources

1. Fuel storage tanks would be constructed with submerged fill pipes to control formation of vapors during filling.

2. Fuel storage tanks would be painted a light color acceptable to the BLM to reduce the temperature rise caused by absorption of solar radiation, and the evaporation of fuel induced by the temperature rise.

6.5.1.3 Mobile Sources

1. Onsite vehicles would be routinely maintained.

6.5.1.4 Fugitive LFG

1. The LFG collection system would be designed and operated to collect at least 80 percent of the generated LFG at locations where the waste is deep enough (i.e., 20 feet over collector) to avoid excess air infiltration.

6.5.1.5 Odor

1. Carbon filters for two train loads of containers would be available for covering vents within 12 hours during any prolonged rail delay.

2. After each container is emptied, it would be washed with high pressure water hoses to remove residual MSW and thereby reduce odor. The wash water would be treated to remove organic.

6.5.2 INCORPORATED TO AVOID SIGNIFICANT IMPACTS

1. There would be no potential for significant air quality or odor impacts after mitigations incorporated into project design are implemented.

6.6 LEVEL OF SIGNIFICANCE AFTER MITIGATION MEASURES

1. Based upon the changes in MSW residue disposal locations which would result from the Proposed Action, regulatory requirements which must be satisfied (including offsets to be provided for site stationary emission sources), and measures that would be incorporated into

the project design, the net effects of the Proposed Action would be mitigated so that no significant adverse air quality or odor impacts would occur, considering each of the measures of significance described in Section 6.2.7 (see Table 6.31).

2. Air quality in SOCAB would be improved because of decreased emissions resulting from reduced MSW residue transfer truck traffic to local landfills in that area. The net changes in the Salton Trough portion of SEDAB might also contribute positively toward reducing the potential for O_3 exceedances to occur in the Coachella Valley and Imperial County, but at least would cause no significant adverse impact.

3. The transition of economic activity at the site from mining to landfilling would locally reduce both mass emissions and ambient concentrations, thereby preventing the occurrence of significant (adverse) air quality impacts. This would result in a net improvement of local air quality. This localized net improvement, together with the proposed landfilling of Imperial County agricultural wastes that are currently burned, would not contribute to the severity or frequency of current AAQS violations and would likely result in earlier attainment of AAQS in Imperial County.

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TABLES

TABLE 1.1
AMBIENT AIR QUALITY STANDARDS

POLLUTANT	AVERAGING TIME	CALIFORNIA STANDARDS (CAAQS)(1)		NATIONAL STANDARDS (NAAQS)(2)		
		Concentration (3)	Method (4)	Primary (3,5)	Secondary (3,4,6)	Method (7)
O_3	1 Hour	90 ppbv (180 $\mu g/m^3$)	Ultraviolet Photometry	120 ppbv (235 $\mu g/m^3$)	Same as Primary Standards	Ethylene Chemiluminescence
CO	8 Hour	9.0 ppmv (10 mg/m^3)	Nondispersive Infrared Spectroscopy (NDIR)	9 ppmv (10 mg/m^3)	–	NDIR
	1 Hour	20 ppmv (23 mg/m^3)		35 ppmv (40 mg/m^3)		
NO_2	Annual Average	–	Gas Phase Chemiluminescence	53 ppbv (100 $\mu g/m^3$)	Same as Primary Standards	Gas Phase Chemiluminescence
	1 Hour	250 ppbv (470 $\mu g/m^3$)		–		
SO_2	Annual Average	–	Ultraviolet Fluorescence	30 ppbv (80 $\mu g/m^3$)	–	Pararosoaniline
	24 Hour	50 ppbv (131 $\mu g/m^3$)(8)		140 ppbv (365 $\mu g/m^3$)	–	
	3 Hour	–		–	500 ppbv (1,300 $\mu g/m^3$)	
	1 Hour	250 ppbv (655 $\mu g/m^3$)		–	–	
PM_{10}	Annual Geometric Mean	30 $\mu g/m^3$	Size Selective Inlet High Volume Sampler and Gravimetric Analysis	–	–	Inertial Separation and Gravimetric Analysis
	24 Hour	50 $\mu g/m^3$		150 $\mu g/m^3$	Same as Primary Standards	
	Annual Arithmetic Mean	–		50 $\mu g/m^3$		
SO_4	24 Hour	25 $\mu g/m^3$	Turbidimetric Barium Sulfate	–	–	–
Pb	30 Day Average	1.5 $\mu g/m^3$	Atomic Absorption	–	–	Atomic Absorption
	Calendar Quarter	–		1.5 $\mu g/m^3$	Same as Primary Standards	
H_2S	1 Hour	30 ppbv (42 $\mu g/m^3$)	Cadmium Hydroxide	–	–	–
Vinyl Chloride (chloroethene)	24 Hour	10 ppbv (26 $\mu g/m^3$)	Tedlar Bag Collection, Gas Chromatography	–	–	–
Visibility Reducing Particles(9)	8 hour (10 a.m. to 6 p.m., PST)	Insufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent. Measurement in accordance with CARB Method V.		–	–	–

91-296 (3/12/94/rb)

(1) California standards for O_3, CO, SO_2 (1 hour), NO_2, PM_{10}, and visibility reducing particles are values that are not to be equaled or exceeded.

(2) National standards, other than O_3 and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The O_3 standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.

(3) Equivalent units given in parentheses are based upon a reference temperature of 25° C and a reference pressure of 760 mm mercury. Measurements of air quality are corrected to a reference temperature of 25° C and a reference pressure of 760 mm mercury (1,013.2 millibar); ppmv and ppbv in this table refer to ppm and ppb by volume, respectively, or micromoles of pollutant per mole of gas.

(4) Equivalent procedure, which can be shown to the satisfaction of CARB to provide equivalent results at or near the level of the air quality standard, may be used.

(5) National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect public health. Each state must attain the primary standards no later than three years after that state's implementation plan is approved by EPA.

(6) National Secondary Standards: The levels of air quality necessary to protect public welfare from any known or anticipated adverse effect of a pollutant. Each state must attain the secondary standards within a "reasonable time" after the state implementation plan is approved by EPA.

(7) Reference method as described by EPA. An "equivalent method" of measurement may be used, but must have a "consistent relationship to the reference method" and must be approved by EPA.

(8) At locations where state standards for oxidant and/or PM_{10} are violated. National standards apply elsewhere.

(9) This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range when relative humidity is less than 70 percent.

TABLE 1.2

STATIONARY SOURCE EMISSIONS THRESHOLDS FOR OFFSETS

POLLUTANT	EMISSIONS THRESHOLD FOR OFFSETS (lb/day)
NO_x	137
ROG	137
SO_x	137
PM_{10}	137

91-296 (11/4/93/jtw)

TABLE 2.1

DOMINANT WIND DIRECTIONS IN AND AROUND IMPERIAL COUNTY DURING 1991

PERIOD	IMPERIAL, CA	MESQUITE MINE	BLYTHE, CA	YUMA, AZ
Annual	W	W, N	S, N	SSE, N
January	SW to NW	N,NNE	N	ND(1)
February	SW to W	N, NNE	N	NE
March	W	N	WSW and S	W, WNW, S
April	W	WNW, W	WSW, SW, N	W to NW
May	W	W, WSW, WNW	S to WSW	W to NW, S
June	WSW, W	W, to WNW, S	S	S, SSE, SSW, W
July	E, ESE	S, SSE, SSW	S	S to SE
August	SSW, E, W	S, to W, SSE	S	S, SSE
September	W, WSW, E, ESE	SSW, S, NNE	S	S to SE
October	WSW, SW, W	NNE, N, NE, W	N, S	N, S, SSE
November	SW to W	NNE, N, NE	N	N, NNE, NNW
December	SW to NW	NNE, N, NE	N	N

91-296 (11/4/93/jtw)

(1) ND = No data.

TABLE 2.2

24-HOUR PM_{10} CONCENTRATIONS AT MESQUITE MINE MONITORS DURING 1991 WITH AT LEAST ONE EXCEEDANCE OF CAAQS[1]

DATE	PREVAILING WIND DIRECTION	PREVAILING WIND SPEED	MONITORING STATIONS				NOTES
			HWY 78[2]	NB[3]	NEB[4]	S16[5]	
3/13/91	No wind data	12.5	18.6	19.9	72.4 E[6],U[7]	25.1	No wind direction data available (equipment malfunction).
5/6/91	West	5.5	50.4 E,N[8]	44.6	No Data	80.9 E,U	Strong winds (10-15 mph) from the west-west-northwest in the afternoon. Probably offsite sources. Mine could potentially have contributed to S16, but not to Highway 78. Gravel borrow may have also contributed.
5/30/91	West	17.4	97.7 E,N	95.2 E,N	123.7 E,U	No Data	Strong winds (10-15 mph) from the west-west-northwest in the afternoon. Probably offsite sources. Bad day all around. Mine could potentially have contributed to NEB and NB, but exceedance appears to be due to natural conditions.
6/17/91	South	5.5	58.9 E,N	36.7	29.7	37.1	Strongest winds from the south (6-8 mph) in the afternoon. Not due to mining activities.
7/29/91	South-Southeast	9.4	54.2 E,N	44.1	38.4	42	Primarily strong southerly winds (8-13 mph) all day. Strong east wind (>20 mph) for an hour around midnight. NB would have been highest, if mine were the cause.
8/4/91	South-Southwest	6.2	72.6 E,N	58.7 E,N	61.1 E,N	67.5 E,N	Strongest winds from the south-southwest in late afternoon (8-12 mph). All sites high, just a bad day. If mine was source, NB would have been highest.
9/3/91	West-Southwest	4.2	32	26.2	35.2	58.6 E,N	Low wind speed (max 5-7 mph) alternating from west to south-southwest. If mine was source, then NB and NEB would have been highest.
9/9/91	South	9.2	61.9 E,N	50	47.5	48.2	Strong winds from 1 p.m.-midnight, (9.5-18.5 mph). Predominantly from south-south-southwest. PM_{10} levels at S16 indicate background levels between 45-50.
11/14/91	Variable	8.0	30.5	43.1	48.8	58.5 E,N	--[9]
11/20/91	Northeast	6.4	71.4 E,U	3.6	No Data	13.5	–
12/19/91	North-Northwest	9.6	36.4	65.7 E,N	93.5 E,N	No Data	–

91-296 (3/14/94/pm)

(1) CAAQS = 50 μg/m³ for 24 hours.
(2) HWY 78 = Old Highway 78 PM_{10} monitoring station.
(3) NB = North boundary PM_{10} monitoring station.
(4) NEB = Northeast boundary PM_{10} monitoring station.
(5) S16 = Section 16 PM_{10} monitoring station.
(6) E = Exceedance measured at PM_{10} station.
(7) U = Mine could potentially contribute to exceedance.
(8) N = Exceedance at this station not due to mine.
(9) – = Not applicable.

TABLE 2.3

1991 and 1992 PM_{10} SUMMARY
($\mu g/m^3$)

1991

MONITORING STATION	1ST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER	STATION ANNUAL ARITHMETIC MEAN	STATION ANNUAL GEOMETRIC MEAN
Old Highway 78	17.1	34.6	31.3	23.2	26.6	25.6
North Boundary	11.2	28.3	25.1	13.6	19.6	18.1
Section 16	13.3	33.7	29.5	20.1	24.2	22.7
Northeast Boundary	10.1	31.8	25.3	17.1	21.2	19.3
Site Quarterly						
• Arithmetic Mean	12.9	32.1	27.8	18.5	22.8(1)	–
• Geometric Mean	12.7	32.0	27.7	18.1	–	21.2(2)

(1) Overall annual arithmetic mean.
(2) Overall annual geometric mean.

1992

MONITORING STATION	1ST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER	STATION ANNUAL ARITHMETIC MEAN	STATION ANNUAL GEOMETRIC MEAN
Old Highway 78	9.4	22.4	23.5	13.5	17.2	16.1
North Boundary	7.1	17.5	20.5	9.7	13.7	12.5
Section 16	11.1	28.5	24.7	15.0	19.8	18.5
Northeast Boundary	8.1	29.7	20.5	10.6	17.2	15.1
Site Quarterly						
• Arithmetic Mean	8.9	24.5	22.3	12.2	17.0(1)	–
• Geometric Mean	8.8	24.0	22.2	12.0	–	15.4(2)

91-296 (3/12/94/rb)

(1) Overall annual arithmetic mean.
(2) Overall annual geometric mean.
Two Year Arithmetic Mean = 19.9 $\mu g/m^3$
Two Year Geometric Mean = 18.1 $\mu g/m^3$

TABLE 2.4

1992 AIR QUALITY MONITORING RESULTS

MONTH/ YEAR	CONCENTRATIONS (ppbv)							
	O_3[1]				NO_2[2]			
	Mean	Maximum	Date	Time (PST)	Mean	Maximum	Date	Time (PST)
May 1992	36	61	25	5:00 p.m.	2	8	24/25	Midnight
June 1992	43	84	27	9:00 a.m.	3	23	16/17	Midnight
July 1992	31	90[3]	17	9:00 a.m.	2	33	2	10:00 p.m.
August 1992	35	94[4]	15	9:00 a.m.	2	33	26	10:00 p.m.
September 1992	35	78	9	8:00 a.m.	3	34	26	9:00 p.m.
October 1992	34	76	19	11:00 a.m.	3	39	6	10:00 p.m.
November 1992	34	70	18	4:00 p.m.	3	32	6	10:00 p.m.
December 1992	29	41	3 6	12:00 noon 3:00 p.m.	4	31	9	10:00 p.m.
January 1993	28	47	29	12:00 noon	2	36	28	10:00 p.m.
February 1993	33	59	7	1:00 p.m.	4	27	12	10:00 p.m.
March 1993	39	78	10	12:00 noon	4	27	2	9:00 p.m.
April 1993	53	100[5]	28	4:00 p.m.	5	35	9	1:00 a.m.
May 1993	49	88	2	5:00 p.m.	5	16	5	2:00 a.m.
Overall	37	100	--	--	3	39	--	--

91-296 (3/12/94/rb)

(1) CAAQS = 90 ppbv for 1 hour.
(2) CAAQS = 250 ppbv for 1 hour.
(3) Occurred when wind blew from the southwest.
(4) Occurred when wind blew from the southwest.
(5) Occurred when wind blew from the northwest.

TABLE 2.5

MEAN SUMMER MIXING HEIGHTS

LOCATION	MORNING (feet)	AFTERNOON (feet)
SOCAB	1,500[1] - 2,200[2]	2,500[1] - 3,400[2]
Salton Trough[3][4]	8,000	16,000

91-296 (3/12/94/rb)

(1) EPA, 1972.
(2) Taylor and Marsh, 1991.
(3) NOAA, 1992.
(4) Includes Coachella Valley and Imperial County.

TABLE 2.6

SOCAB CRITERIA POLLUTANTS ATTAINMENT STATUS

POLLUTANT AND AVERAGING TIME	STANDARD		ATTAINMENT STATUS[1]	
	Federal	State	Federal[2]	State[3]
Ozone (O_3) (ppbv)				
• 1 Hour	120	90	N	N
Nitrogen Dioxide[4] (NO_2) (ppbv)				
• 1 Hour	--[4]	250	--	N
• Annual Average	53	--	N	--
PM_{10} ($\mu g/m^3$)				
• 24 Hours	150	50	N	N
• Annual Geometric Mean	--	30	--	N
• Annual Arithmetic Mean	50	--	N	--
Sulfur Dioxide[5] (SO_2) (ppbv)				
• 1 Hour	--	250	--	A
• 3 Hours	500	--	A	--
• 24 Hours	140	50	A	A
• Annual Average	30	--	A	--
Carbon Monoxide (CO) (ppmv)				
• 1 Hour	35	20	N	N
• 8 Hours	9	9	N	N

91-296 (3/12/94/rb)

(1) Attainment Status Designation:
A = Attainment
N = Nonattainment

(2) EPA Region 9.

(3) CARB, July 1991b.

(4) -- = Not Applicable

(5) Regulated as a nonattainment pollutant. (NO_2 is a precursor to both ozone and PM_{10}; SO_2 is a precursor to PM_{10}).

TABLE 2.7

O_3 EXCEEDANCES IN THE COACHELLA VALLEY (1)

VARIABLE	YEAR						
	1986(2)(3)	1987(3)(4)	1988(5)(6)	1989(5)(7)	1990(5)(8)	1991(5)(9)	1992(5)(10)
Number of Exceedance Hours							
• Banning	376	409	527	525	358	276	NA (11)
• Palm Springs	363	303	378	485	341	314	NA
• Indio	(12)	250	(5)	361	166	213	NA
Number of Exceedance Days							
• Banning	80	96	118	112	75	64	66
• Palm Springs	80	74	99	108	73	72	69
• Indio	(12)	41	(5)	76	47	48	45
Highest Concentration (ppbv)							
• Banning	220	210	260	230	220	200	160
• Palm Springs	180	170	200	190	170	180	150
• Indio	80	160	50	160	160	180	140

92-296 (3/12/94/rb)

(1) O3 "Season" = March through October.
(2) CARB, 1987.
(3) CAAQS = 100 ppbv.
(4) CARB, 1988.
(5) CAAQS = 90 ppbv.
(6) CARB, 1989b; SCAQMD, 1989.
(7) CARB, 1990; SCAQMD, 1990b.
(8) CARB, 1991b, SCAQMD, 1991b.
(9) CARB, 1992, SCAQMD, 1992a.
(10) SCAQMD, 1993b.
(11) NA = Not available.
(12) Insufficient data.

TABLE 2.8

PM_{10} EXCEEDANCES IN THE COACHELLA VALLEY[1]

VARIABLE	YEAR						
	1986[2]	1987[3]	1988[4]	1989[5]	1990[6]	1991[7]	1992[8]
Number of Exceedance Days							
• Indio	25	25	20	39	41	37	18
• Palm Springs	--	5	8	17	9	14	4
Highest Concentration ($\mu g/m^3$)							
• Indio	111	115	115	712	520	340	117
• Palm Springs	--[9]	121	77	292	83	197	175

91-296 (3/12/94/rb)

(1) CAAQS = 50 $\mu g/m^3$
(2) CARB, 1987.
(3) CARB, 1988; SCAQMD, 1988.
(4) CARB, 1989b; SCAQMD, 1989.
(5) CARB, 1990; SCAQMD, 1990b.
(6) CARB, 1991b; SCAQMD, 1991b.
(7) CARB, 1992a; SCAQMD, 1992a.
(8) SCAQMD, 1993b.
(9) Insufficient data.

TABLE 2.9

AMBIENT AIR QUALITY POLLUTANTS AND METEOROLOGICAL VARIABLES MONITORED BY ICAPCD

SITE	VARIABLES
Niland, California (7711 English Road)	• Wind speed and direction • Temperature inside shelter and dewpoint • Hydrogen sulfide
El Centro, California (150 South 9th Street)	• PM_{10} • Ozone • Wind speed and direction • Temperature inside shelter
Winterhaven, California (509 2nd Avenue)	• Total suspended particulates (TSP)
Brawley, California (401 Main Street)	• PM_{10}
Calexico-Grant Calexico, California (900 Grant Street)	• PM_{10} • Ozone • Wind speed and direction • Temperature inside shelter • NO_x (since June 1992)
Calexico Fire Station Calexico, California (430 East 5th Street)	• PM_{10}

91-296 (3/12/94/rb)

TABLE 2.10

O_3 EXCEEDANCES AT EL CENTRO

VARIABLE	YEAR						
	1986[(1)(2)]	1987[(1)(3)]	1988[(4)(5)]	1989[(4)(6)]	1990[(4)(7)]	1991[(4)(8)]	1992
Number of Exceedance Hours	[(9)]	[(9)]	28	8	8	5	28
Number of Exceedance Days	[(9)]	[(9)]	17	4	6	3	10
Highest Concentration (ppbv)	90	90	120	110	110	110	120
O_3 "Season"	No data	No data	Mar - Nov	Feb - May	Mar - Jun	Jun - Oct	Apr - Dec

91-296 (3/12/94/rb)

(1) CAAQS = 100 ppbv.
(2) CARB, 1987.
(3) CARB, 1988.
(4) CAAQS = 90 ppbv, one-hour average.
(5) CARB, 1989b.
(6) CARB, 1990.
(7) CARB, 1991b.
(8) CARB, 1992a.
(9) Prior to CAAQS 90 ppbv standard.

TABLE 2.11

O_3 EXCEEDANCES AT CALEXICO AND EL CENTRO[1]

DATE	TIME	CALEXICO				EL CENTRO			
		O_3 (ppbv)	WS[2] (mph)	WD[3]	Exceedances	O_3 (ppbv)	WS (mph)	WD	Exceedances
May 7, 1991 through June 15, 1991	Midnight Noon	100 to 110	NA[4]	NA	16	NA	NA	NA	0
June 15, 1991	1:00 p.m.	110	5	NW	1	100	1	ESE	1
July 3, 1991	4:00 p.m.	100	NA	NA	1	100	3	NNE	1
July 3, 1991	5:00 p.m.	110	NA	NA	1	100	2	NNE	1
July 3, 1991	6:00 p.m.	70	NA	NA	1	110	3	SE	1
July 3, 1991 through October 3, 1991	7:00 p.m. 11:00 a.m.	NA	NA	NA	9	NA	NA	NA	NA
October 5, 1991	5:00 p.m.	NA	NA	NA	NA	100	NA	NA	1
October 16, 1991 through November 27, 1991	11:00 a.m. 11:00 a.m.	NA	NA	NA	6	NA	NA	NA	NA

91-296 (12/13/93/cm)

(1) ICAPCD, 1992b.
(2) WS = Wind speed.
(3) WD = Wind direction.
(4) NA = Not available.

TABLE 2.12

PM_{10} EXCEEDANCES OF CAAQS[1] AT EL CENTRO AND BRAWLEY

VARIABLE	YEAR						
	1986[2]	1987[3]	1988[4]	1989[5]	1990[6]	1991[7]	1992
Number of Exceedance Days							
• Brawley	20	31	17	35	33	33	23
• El Centro	12	24	24	31	22	31	14
Highest Concentration ($\mu g/m^3$)							
• Brawley	191	148	368	676	258	229	103
• El Centro	230	157	192	287	100	243	80

91-296 (3/12/94/rb)

(1) CAAQS = 50 $\mu g/m^3$, 24-hour average.
(2) CARB, 1987.
(3) CARB, 1988.
(4) CARB, 1989b.
(5) CARB, 1990.
(6) CARB, 1991b.
(7) CARB, 1992a.

TABLE 2.13
SUMMARY OF AIR BASIN CHARACTERISTICS

GENERAL CHARACTERISTICS

GEOGRAPHIC AREA	SIZE (sq. miles)	POPULATION (1987)	1987 BASELINE EMISSIONS (10^6 lbs/day)			CLIMATE	
			NO_x	ROG	PM_{10}	Average Temperature (° F)	Average Annual Rainfall (inches)
SOCAB	6,600	13.7 million	2.3[6]	2.5[6]	1.6[6]	64[1]	15[1]
Salton Trough							
Imperial County	4,600	120,000	0.06[8]	0.06[8]	3.7[8]	73	2.5[2]
Coachella Valley	3,200	400,000	0.1[6]	0.3[6]	0.5[7]	72	5[1,2]

AIR POLLUTANT DISPERSION CHARACTERISTICS

GEOGRAPHIC AREA	CONTROLLING FACTORS					GENERAL SUMMERTIME DISPERSION CHARACTERISTICS
	Average Wind Speed (mph)	Predominant Direction From Which Wind Originates	Approximate Summer Mixing Heights (feet)		Topographic Constraints	
			Morning	Afternoon		
SOCAB	5	West	1,500[2,3] - 2,200[4]	2,500[3] - 3,400[4]	Mountains north and east. Inversion zone blocked most of day by elevation of Banning Pass at El. 2,200 ft.	• Poor mixing conditions. • Nighttime NO_x and ROG emissions trapped.
Salton Trough	7 to 9	Northwest except southeast for July and August	8,000[5]	16,000[5]	Wind flow channeled by mountains to northeast and southwest.	• Very good mixing conditions. • Nighttime NO_x and ROG emissions dispersed.

NONATTAINMENT POLLUTANTS AND PRIMARY SOURCES

GEOGRAPHIC AREA	NONATTAINMENT POLLUTANTS							
	O_3		PM_{10}		NO_2		CO	
	Status	Primary Source	Status	Primary Source	Status	Primary Source	Status	Primary Source
SOCAB	Extreme federal nonattainment of CAAQS and NAAQS	SOCAB	Nonattainment of NAAQS and CAAQS	Industrial and vehicular emissions atmospheric reactions	Nonattainment of NAAQS in downtown Los Angeles	Vehicular emissions	Nonattainment of NAAQS in downtown Los Angeles	Vehicular emissions
Salton Trough								
Imperial Valley	Moderate nonattainment of CAAQS only	Transport from Mexicali, SOCAB, and San Diego	Nonattainment of NAAQS and CAAQS	Desert roads and agriculture; land and unpaved roads, and industry in Mexico	Attainment	--	Unclassified	--
Coachella Valley	Moderate nonattainment of NAAQS and CAAQS	Transport From SOCAB	Nonattainment of NAAQS and CAAQS	Dirt roads and construction	Attainment	--	Attainment	--
Precursor Emissions	NO_x, ROG		PM_{10}, NO_x, ROG, SO_x		NO_x		CO	

91-296 (12/13/93/cm)

(1) SCAQMD, 1980.
(2) Gale Research Company, 1978.
(3) EPA, 1972.
(4) Taylor and Marsh, 1991.
(5) National Climatic Data Center, 1992.
(6) SCAQMD, 1991a.
(7) SCAQMD, 1990a.
(8) ICAPCD, 1992a.

TABLE 6.1

SCHEDULE FOR AMOUNT OF MSW RESIDUE TO BE SHIPPED

MSW RESIDUE DISPOSAL RATE(1)	PROPOSED ACTION (AND ALTERNATIVE III)		ALTERNATIVE I PROJECT		ALTERNATIVE II PROJECT		ALTERNATIVE IV PROJECT	
	First Year Number	Last Year Number	First Year Number	Last Year Number	First Year Number	Last Year Number	First Year Number	Last Year Number
4,000	1	1	1	1	1	1	1	1
8,000	2	2	2	2	2	2	2	2
12,000	3	6	3	6	3	165	3	6
16,000	7	7	7	7	NA(2)	NA	7	7
20,000	8	100	8	85	NA	NA	8	13
24,000	NA	NA	NA	NA	NA	NA	NA	NA
30,000	NA	NA	NA	NA	NA	NA	18	73

91-296 (3/12/94/rb)

(1) Tons per day.
(2) NA = Not Applicable.

TABLE 6.2

ASSUMPTIONS FOR ESTIMATING LFG GENERATION RATE

1. MSW Residue Disposal Rate: 4,000 tpd, 8,000 tpd, 12,000 tpd, 16,000 tpd, and 20,000 tpd on the schedule shown in Table 6.1.

2. Characteristics of Average MSW residue after AB 939:

	% of MSW Residue Mass (Wet)[1]		
Component	1994 - 1999	2000 - on	Moisture Content (%)[2]
Food waste	13	20	70
Paper waste	31	20	6
Vegetative waste	16	16	60
Remainder (glass, rubber, metal, etc.)	40	44	6
	100	100	23 overall

3. Density of Compacted MSW Residue Approximately = 1,200 lb/cubic yard.

4. Precipitation Infiltration: 30 percent of 4 inches per year precipitation (=1.2 inch per year).

5. Water conditioning to enhance LFG generation is treated like 100 percent infiltration of artificial precipitation.

6. Water conditioning would bring moisture content on a wet basis of the MSW residue at the top of the landfill from 23 to 40 percent.

7. Organic molecules in MSW residue react anaerobically to generate equal volumes of methane and CO_2. Food waste organic molecules are represented by the sugar molecule ($C_6H_{12}O_6$). Paper and vegetative waste molecules are represented by the cellulose molecule ($C_6H_{10}O_5$).

8. Total generation of methane molecules per unit mass of dry MSW residue is proportional to initial moisture content on a wet basis.

9. Portion of precipitation that infiltrates the MSW residue distributes in the three organic components (food, paper, and vegetation) in direct proportion to relative mass of each of these components.

10. Original moisture in MSW residue is not lost from landfill by evapotranspiration or drainage.

11. Methane generation is highest at the initiation of anaerobic decomposition and decreases over time such that the time rate of loss of organic mass at any time is proportional to the amount of organic mass remaining at that point in time (i.e., first order kinetic model, Scholl Canyon model).

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(1) SWANA (1991) modified by the 25 and 50 percent recycling requirements of AB 939, respectively.
(2) SWANA (1991).

TABLE 6.3

FLARE THERMAL DESTRUCTION EFFICIENCY[1]

FLARED LANDFILL GAS NONMETHANE ORGANIC COMPOUNDS	BKK FLARE[1] DESTRUCTION (percent)	PUENTE HILLS FLARE[1] DESTRUCTION (percent)	SCHOLL CANYON FLARE[1] DESTRUCTION (percent)	SPADRA FLARE[1] DESTRUCTION (percent)	ARITHMETIC MEAN FLARE DESTRUCTION (percent)	CAS NO.	SYNONYMS
Benzene	99.66	76.88	99.3	98.47	93.58	71-43-2	--
Carbon Tetrachloride	99.97	96.92	99.9	99.2	99.00	56-23-6	Tetrachloromethane
Tetrachloroethene (PCE)	99.84	99.96	99.9	99.31	99.75	127-18-4	Perchloroethylene
Toluene	99.47	99.77	99.9	99.54	99.67	108-88-3	--
Trichloroethylene (TCE)	99.87	99.96	99.9	99.75	99.87	79-01-6	Trichloroethene
Vinyl Chloride	99.98	99.35	99.9	99.35	99.65	75-01-4	--
Arithmetic Mean Destruction Efficiency (%)	99.80	95.47	99.80	99.27	98.5	--	--

91-296 (3/12/94/rb)

(1) Pease, Robert R., Mohsen Nazemi, Rod Millican, and Stacey M. K. Ebiner. Control options for landfill gas, Paper 89-155.005 presented at the Air and Waste Management Association Annual Meeting, Anaheim, California, June 26-30, 1989.

-- = None

TABLE 6.4

EMISSIONS FACTORS FOR LANDFILL GAS THERMAL DESTRUCTION

DEVICE	EMISSION FACTOR (lb/million BTU)				
	NO_x	ROG	PM_{10}	SO_x	CO
Flare[(1)]	0.062	0.01	0.025	0.012	0.01
Boiler[(2)]	0.035	0.0017	0.0006	0.02	0.0002

91-296 (3/12/94/rb)

(1) Carnot. Emissions tests on the Puente Hills Energy Recovery from Landfill Gas (PERG) Facility - Unit 400, report prepared for County Sanitation Districts of Los Angeles County, September 1991a.

(2) Carnot. SCAQMD Performance Tests on the SPADRA Energy Recovery from Landfill Gas (SPERG) Facility, October 1991b.

TABLE 6.5

ESTIMATED PROJECT SITE EMISSIONS AT YEAR 16 AND YEARS 85/100 WITH "AS RECEIVED" MSW RESIDUE

I. YEAR 16 USING A FLARE

SOURCE	EMISSIONS (lbs/day)				
	NO_x	ROG	PM_{10}	SO_x	CO
Stationary Sources	650	100	260	130	100
Fugitive Sources	0	140	90	0	0
Mobile Sources	1,570	290	50	40	1,310
TOTAL	**2,220**	**530**	**400**	**170**	**1,410**

II. YEARS 85/100 USING A BOILER/GENERATOR

SOURCE	EMISSIONS (lbs/day)				
	NO_x	ROG	PM_{10}	SO_x	CO
Stationary Sources (Boiler)	630	30	10	360	10
Fugitive Sources	0	250	140	0	0
Mobile Sources	1,590	290	50	50	1,320
TOTAL	**2,220**	**570**	**200**	**410**	**1,330**

91-296 (3/12/94/rb)

TABLE 6.6

ESTIMATED PROJECT SITE EMISSIONS AT YEAR 16 AND YEARS 85/100 WITH "CONDITIONED" MSW RESIDUE

I. YEAR 16 USING A BOILER/GENERATOR

SOURCE	EMISSIONS (lbs/day)				
	NO_x	ROG	PM_{10}	SO_x	CO
Stationary Sources	690	30	10	400	10
Fugitive Sources	0	270	90	0	0
Mobile Sources	1,570	290	50	40	1,300
TOTAL	**2,260**	**590**	**150**	**440**	**1,310**

II. YEAR 85/100 USING A BOILER/GENERATOR AND A LIQUEFIED METHANE PLANT

SOURCE	EMISSIONS (lbs/day)				
	NO_x	ROG	PM_{10}	SO_x	CO
Stationary Sources					
• Boiler	340	20	5	200	10
• LNG Plant	120	120	5	0	20
Fugitive Sources	0	460	140	0	0
Mobile Sources	1,590	290	50	40	1,320
TOTAL	**2,050**	**890**	**200**	**240**	**1,350**

91-296 (3/12/94/rb)

TABLE 6.7

FUGITIVE DUST
ASSUMPTIONS FOR AIR QUALITY EMISSIONS/FACTORS

SUBJECT/PARAMETER	UNITS	YEAR 16		YEAR 85/100	
Paved Road From Intermodal Facility					
• Distance, Round Trip	miles	2.51		3.73	
• Emission Factor Equation	–	EPA(1)		EPA(1)	
- Width of Road	feet	48		48	
- S (silt content of soil)	percent	8		8	
- L (silt loading)	ounces/square yard pounds/mile	$9 \cdot 10^{-4}$ 2		$9 \cdot 10^{-4}$ 2	
- Precipitation Days >0.01 inch	–	0		0	
• Emission Factor (uncontrolled)	pounds per vehicle miles traveled	0.13		0.13	
• Control Technique	–	Daily Water Flush		Daily Water Flush	
• Control Efficiency	percent	75		75	
"Paved" Road From Cover Storage Areas					
• Distance, Round Trip	miles	1.92		4.72	
• Emission Factor Equation	–	EPA(1)		EPA(1)	
- Width of Road	feet	48		48	
- S (silt content of soil)	percent	8		8	
- L (silt loading)	ounces/square yard pounds/mile	$9 \cdot 10^{-4}$ 2		$9 \cdot 10^{-4}$ 2	
- Precipitation Days >0.01 inch	–	0		0	
• Emission Factor (uncontrolled)	pounds per vehicle miles traveled	0.13		0.13	
• Control Technique	–	Weekly Water Flush		Weekly Water Flush	
• Control Efficiency	percent	75		75	
Unpaved Road To Working Face					
• Emission Factor Equation	–	Wyoming DEQ(2)		Wyoming DEQ	
- Silt Content of Soil	percent	8		8	
- Precipitation Days (>0.01 inch)	–	0		0	
- Number of Wheels					
• Waste Trucks	–	18		18	
• Cover Haul Trucks	–	10		10	
		Dust Suppressant Part	Water Part	Dust Suppressant Part	Water Part
- Speed	miles per hour	20	10	20	10
• Distance, Round Trip	miles feet	0.0528 750	0.0528 750	0.0528 750	0.0528 750
• Emission Factor (uncontrolled)					
- Waste Haul	pounds per vehicle miles traveled	1.76	0.44	1.76	0.44
- Cover Haul	pounds per vehicle miles traveled	0.978	0.244	0.978	0.244
• Control Technique	–	Lignin Sulfonate	Watering	Lignin Sulfonate	Watering
• Control Efficiency	percent	95	90	95	90

(1) EPA. Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources (4th Edition), PB8.6-124906, Section 11.2.6: Industrial Paved Roads, page 11.2.6-3, 1985.

(2) DEQ = Wyoming Department of Environmental Quality. Internal memorandum from Charles A. Collins on January 24, 1979.

TABLE 6.7

FUGITIVE DUST
ASSUMPTIONS FOR AIR QUALITY EMISSIONS/FACTORS
(Continued)

SUBJECT/PARAMETER	UNITS	YEAR 16	YEAR 85/100
Landfill Equipment Construction			
• Emission Factor Source	–	EPA[3]	EPA[3]
• PM_{10} Fraction	–	0.219	0.219
• TSP Emission Factor	ton / acre-month	1.2	1.2
• PM_{10} Emission Factor	pound / acre-day	17.5	17.5
• Control Technique	–	Watering	Watering
• Control Efficiency	percent	90	90
• Total Area Affected	acre / day	1.5	1.5
• Dimensions			
- Working Face	square meter acre	4,620 1.14 (225 feet x 225 feet) (69 meters x 69 meters)	4,620 1.14 (225 feet x 225 feet) (69 meters x 69 meters)
- Cover Borrow	square meter acre	2 x 900 2 x 0.22 2 x (100 feet x 100 feet) 2 x (31 meters x 31 meters)	2 x 900 2 x 0.22 2 x (100 feet x 100 feet) 2 x (31 meters x 31 meters)
Wind Erosion			
• Emission Factor Source	–	EPA[4]	EPA[4]
• PM_{10} Fraction	–	0.219	0.219
• Silt Content	percent	1.6	1.6
• PM_{10} Emission Factor	pound/acre-day	0.62	0.62
• Precipitation Days (>0.01 inch)	–	0	0
• Control Technique	–	Watering	Watering
• Control Efficiency	percent	90	90
• Dimensions			
- Working Face	square meter acre	30,000 7.4 (570 feet x 570 feet) (173 meters x 173 meters)	30,000 7.4 (570 feet x 570 feet) (173 meters x 173 meters)
- Cover Borrow	square meter acre	30,000 7.4 (1,000 feet x 330 feet)	30,000 7.4 (1,000 feet x 330 feet)

91-296 (3/13/94/cm)

(3) EPA (same as other U.S. EPA references through document number), Section 11.2.4: Heavy construction operations, p. 11.2.4-1, 1985.

(4) EPA (same as other U.S. EPA references through document number), Section 11.2.3: Aggregate handling and storage piles, p. 11.2.3-5, 1985.

TABLE 6.8

SUMMARY OF EMISSION SOURCES AND CONTROL ASSUMPTIONS

SOURCE	BACT[1] EQUIPMENT	MINIMUM 80% LFG[2] COLLECTION	99% TRACE GAS DESTRUCTION	PAVED ROADS	WATER SPRAYING	DUST SUPPRESSANTS	CARB[3]/EPA AIR POLLUTION CONTROL ASSUMPTIONS	LOW SULFUR FUEL
A. AT PROJECT SITE								
• Stationary								
- Flare	X		X					
- Boiler	X		X					
- Miscellaneous Stacks	X							
• Fugitive								
- LFG		X						
- PM_{10} Emissions				X	X	X		
• Mobile								
- Cranes							X	X
- Disposal Equipment							X	X
- Construction Equipment							X	X
- Container Trucks							X	X
- Miscellaneous Site Vehicles							X	X
B. RELATED MSW[4] RESIDUE TRANSPORT								
• Trains							X	X
• Transfer Trucks							X	X

91-296 (3/12/94/rb)

(1) BACT = Best Available Control Technologies
(2) LFG = Landfill Gas
(3) CARB = California Air Resources Board
(4) MSW = Municipal Solid Waste

TABLE 6.9

CONSTRUCTION EMISSIONS AT PROJECT SITE (lb/day)

ACTIVITY	NO_x	ROG	PM_{10}	SO_x	CO
Construction	1,070	120	350	20	550
Landfill Site at 12,000 tpd in Year 3	1,440	230	170	50	990

91-296 (3/12/94/rb)

TABLE 6.10

AGRICULTURAL EMISSION CONVERSION FACTORS[1]

ITEM	TONS/ACRE	NO_x	ROG[2]	PM_{10}[3]
Wheat[4]	1.9	4	9	13
Grasses	1.0	4	15	16
Asparagus	1.5	4	66	40

91-296 (3/12/94/rb)

(1) EPA (1985) in units of pounds of pollutant per ton of burned plant material.
(2) Presented as non-methane hydrocarbons in EPA (1985).
(3) For burning of agricultural plant material, all particulate emissions are PM_{10} in size.
(4) Emission factors presented for wheat are for the backfire burning technique which has generally lower air pollutant emissions.

TABLE 6.11

SITE EMISSION CHANGE COMPARISON WITH "AS RECEIVED" MSW RESIDUE[1]

CHANGE/ BENEFIT	EMISSIONS (lbs/day)				
	NO_x	ROG	PM_{10}	SO_x	CO
Mesquite Mine Decrease from 1990-1992 Actual to No Emissions After 2007	4,170	280	1,960	60	910
Mesquite Regional Landfill Maximum Increase at Site	2,220	570	200	410	1,330
Site Benefit[2]	1,950	-290	1,760	-350	-420
O_3 and PM_{10} (with precursors) Benefits[2]	1,660		1,410		--

91-296 (3/12/94/rb)

(1) This table compares emissions at different times. The mine emissions will decrease until the year 2007. Offsets from these decreases will be only available to the year 2010, when actual historic emissions over the previous three years become zero.

(2) A positive number indicates a net decrease.

-- = Not applicable.

TABLE 6.12

SITE EMISSION CHANGE COMPARISON WITH "CONDITIONED" MSW RESIDUE[1]

CHANGE/ BENEFIT	EMISSIONS (lbs/day)				
	NO_x	ROG	PM_{10}	SO_2	CO
Mesquite Mine Decrease from 1990-1992 Actual to No Emissions After 2007	4,170	280	1,960	60	910
Mesquite Regional Landfill Maximum Increase at Site	2,050	890	200	240	1,350
Site Benefit[2]	2,120	-610	1,760	-180	-440
O_3 and PM_{10} (with precursor) Benefits[2]	1,510		1,580		--

91-296 (3/12/94/rb)

(1) This table compares emissions at different times. The mine emissions will decrease during the period 1997-2007. Offsets from these decreases will be only available to the year 2010, when actual historic emissions over the previous three years becomes zero.

(2) A positive number indicates a net decrease.

-- = Not applicable.

TABLE 6.13

ESTIMATED MSW RESIDUE TRANSPORT-RELATED EMISSIONS AT 20,000 TONS PER DAY (lb/day) FOR YEARS 85/100

LOCATION/SOURCE	NO_x	ROG	PM_{10}	SO_x	CO
SOCAB					
• Trucks	540	110	60	20	420
• LATC	330	30	30	10	140
• Trains	2,610	120	80	60	370
Salton Trough (Trains)					
• Coachella Valley	2,680	120	80	60	380
• Imperial County	1,940	90	60	40	270
TOTAL	8,100	470	310	190	1,580

91-296 (3/12/94/rb)

TABLE 6.14

CONTEXT OF PROJECT-RELATED TRANSPORT EMISSIONS IN SOCAB AT YEARS 85/100

EMISSION SOURCE	NO_x		ROG		PM_{10}		SO_x		CO	
	Lb/Day	Percent[1]	Lb/Day	Percent[1]	Lb/Day	Percent[1]	Lb/Day	Percent[1]	Lb/Day	Percent[1]
All Sources in SOCAB[2]	2,400,000	100	2,800,000	100	2,200,000	100	270,000	100	10,000,000	100
All Trains in SOCAB	63,000	2.6	3,000	0.1	1,400	0.06	4,400	1.6	9,400	0.09
Project-Related Trains	2,600	0.1	120	0.004	80	0.004	60	0.002	370	0.004
Project-Related Container Trucks	540	0.02	110	0.004	60	0.003	20	0.007	420	0.004
Project-Related Activity at LATC	330	0.014	30	0.0011	30	0.0014	10	0.0004	140	0.0014
Project-Related Total in SOCAB	3,480	0.14	260	0.01	160	0.008	80	0.003	920	0.01
No Action Alternative in SOCAB	4,190	0.17	990	0.04	430	0.02	570	0.21	2,660	0.03

91-296 (3/12/94/rb)

(1) Percent of all sources.
(2) SCAQMD AQMP, 1991a.

TABLE 6.15

NET IMPERIAL COUNTY EMISSION INVENTORY AT YEARS 85/100 WITH "AS RECEIVED" MSW RESIDUE[1]

CHANGE/ BENEFIT	EMISSIONS (lbs/day)				
	NO_x	ROG	PM_{10}	SO_x	CO
Mesquite Mine Decreases From 1990-1992 Actual to No Emissions After 2007	4,170	280	1,960	60	910
Mesquite Regional Landfill Maximum Increase in County (including transport)	4,210	660	260	450	1,740
Site Benefit[2]	-40	-380	1,700	-390	-830
O_3 and PM_{10} (with precursors) Benefits[2]	-420		1,310		--

91-296 (3/12/94/rb)

(1) This table compares emissions at different times. The mine emissions will decrease until the year 2007. Offsets from these decreases will be only available to the year 2010, when actual historic emissions over the previous three years become zero.

(2) A positive number indicates a net decrease.

-- = Not applicable.

TABLE 6.16

IMPERIAL COUNTY CHANGES[1] AT YEARS 85/100 WITH "CONDITIONED" MSW RESIDUE

CHANGE/ BENEFIT	EMISSIONS (lbs/day)				
	NO_X	ROG	PM_{10}	SO_X	CO
Mesquite Mine Decrease From 1990-1992 Actual to No Emissions After 2007	4,170	280	1,960	60	910
Mesquite Regional Landfill Maximum Increase (including transport)	4,020	980	260	290	1,730
Site Benefit[2]	150	-700	1,700	-230	-820
O_3 and PM_{10} (with precursors) Benefits[2]	-550		1,470		--

91-296 (3/12/94/rb)

(1) This table compares emissions at different times. The mine emissions will decrease during the period 1997-2007. Offsets from these decreases will be available only to the year 2010, when actual historic emissions over the previous three years becomes zero.

(2) A positive number indicates a net decrease.

-- = Not applicable.

TABLE 6.17

COMPARISON[1] OF PROPOSED ACTION AND NO ACTION ALTERNATIVES MAXIMUM ANTICIPATED EMISSIONS FOR YEAR 100 WITH BOILER/GENERATOR (lb/day) AND "AS RECEIVED" MSW RESIDUE

I. SOCAB

ALTERNATIVES	NO_x	ROG	PM_{10}	SO_x	CO
Proposed Action	3,480	260	160	80	920
No Action	4,190	990	430	570	2,660
All Sources in SOCAB[2] (1987)	2,400,000	2,800,000	2,200,000	270,000	10,000,000

II. COACHELLA VALLEY

ALTERNATIVES	NO_x	ROG	PM_{10}	SO_x	CO
Proposed Action	2,680	120	80	60	380
No Action	0	0	0	0	0
All Sources in Coachella Valley (1987)[1]	134,000	336,000	915,000[3]	17,000	1,170,000

III. IMPERIAL COUNTY

ALTERNATIVES	NO_x	ROG	PM_{10}	SO_x	CO
Proposed Action					
• Site	2,220	570	200	410	1,330
• Employee/Service Vehicles	50	0	0	0	140
• Trains	1,940	90	60	40	270
• Total	4,210	660	260	450	1,740
No Action Alternative	0	0	0	0	0
All Sources in Imperial County (1987)[4]	61,600	57,000	3,700,000	3,600	250,000

91-296 (3/12/94/rb)

(1) Emissions between MSW generators and transfer/compactor stations are identical for project and No Action alternatives. After the trucks leave these stations, the emissions are summed to provide the values in this table.
(2) SCAQMD Air Quality Management Plan, 1991a.
(3) SCAQMD, 1990a.
(4) Imperial County Air Quality Attainment Plan, 1992a.

TABLE 6.18

ESTIMATED PROJECT SITE EMISSIONS

A. ONSITE ALTERNATIVE II - REDUCED DAILY MSW DISPOSAL RATE AT YEAR 16 WITH A FLARE

SOURCE	EMISSIONS (lbs/day)				
	NO_x	ROG	PM_{10}	SO_x	CO
Stationary Sources	450	70	180	90	70
Fugitive Sources	0	100	60	0	0
Mobile Sources	1,150	200	40	30	980
TOTAL	**1,600**	**370**	**280**	**120**	**1,050**

B. ONSITE ALTERNATIVE IV - INCREASED LARGER LANDFILL FOOTPRINT AND DISPOSAL RATE AT YEAR 73 WITH A BOILER/GENERATOR

SOURCE	EMISSIONS (lbs/day)				
	NO_x	ROG	PM_{10}	SO_x	CO
Stationary Sources	940	50	20	540	10
Fugitive Sources	0	370	200	0	0
Mobile Sources	2,240	410	70	60	1,830
TOTAL	**3,180**	**830**	**290**	**600**	**1,840**

91-296 (3/12/94/rb)

TABLE 6.19

SITE EMISSION CHANGES[1] WITH LARGER LANDFILL FOOTPRINT, INCREASED DISPOSAL RATE AND "AS RECEIVED" MSW RESIDUE

CHANGE/ BENEFIT	EMISSIONS (lbs/day)				
	NO_X	ROG	PM_{10}	SO_X	CO
Mesquite Mine Decrease From 1990-1992 Actual to No Emissions After 2007	4,170	280	1,960	60	910
Mesquite Regional Landfill Maximum Increase at Site	3,180	830	290	600	1,840
Site Benefit[2]	990	-550	1,670	-540	-930
O_3 and PM_{10} (with precursors) Benefits[2]	440		1,130		--

91-296 (3/12/94/rb)

(1) This table compares emissions at different times. The mine emissions will decrease until the year 2007. Offsets from these decreases will be available only to the year 2010, when actual historic emissions over the previous three years become zero.

(2) A positive number indicates a net decrease.

-- = ~~???~~ Not Applicable

TABLE 6.20

ESTIMATED COMPRESSED METHANE PLANT EMISSIONS AT YEAR 100 WITH "AS RECEIVED" MSW RESIDUE

SOURCE	EMISSIONS (lbs/day)				
	NO_x	ROG	PM_{10}	SO_x	CO
Compressed Methane Plant					
• VOC Incinerator No. 1	1.2	0	0	0	0.26
• VOC Incinerator No. 2	54	32	2.7	0.31	11
• VOC Incinerator No. 3	32	3	1.5	0.21	6.4
• Condensate Tank Vent	0	11	0	0	0
• Compressor Seals	0	0.6	0	0	0
• Valves, Flanges and Fittings	0	22	0	0	0
TOTAL	87	69	4	0.5	18
Proposed Action					
• Stationary Sources(1)	630	30	10	360	10

91-296 (3/12/94/rb)

(1) Emissions taken from Table 6.5.

TABLE 6.21

ESTIMATED COMPRESSED METHANE PLANT EMISSIONS AT YEAR 100 WITH "CONDITIONED" MSW RESIDUE

SOURCE	EMISSIONS (lbs/day)				
	NO_x	ROG	PM_{10}	SO_x	CO
Compressed Methane Plant					
• VOC Incinerator No. 1	2.3	0.13	0.12	0.01	0.49
• VOC Incinerator No. 2	102	61	5.1	0.59	21
• VOC Incinerator No. 3	60	5.8	2.9	0.39	12
• Condensate Tank Vent	0	20	0	0	0
• Compressor Seals	0	1.2	0	0	0
• Valves, Flanges and Fittings	0	40	0	0	0
TOTAL	164	128	8	1	33
Proposed Action					
• Stationary Sources(1)	460	140	10	200	30

91-296 (3/12/94/rb)

(1) Emissions taken from Table 6.6.

TABLE 6.22

ESTIMATED LIQUEFIED METHANE GAS PLANT EMISSIONS AT YEAR 100 WITH "AS RECEIVED" MSW RESIDUE

SOURCE	EMISSIONS (lbs/day)				
	NO_x	ROG	PM_{10}	SO_x	CO
Liquefied Methane Gas Plant					
• Compressed Methane Plant Sources	87	69	4	0.5	18
• CO_2 Vent	0	22	0	0	0
TOTAL	87	91	4	0.5	18
Proposed Action					
• Stationary Sources(1)	630	30	10	360	10

91-296 (3/12/94/rb)

(1) Emissions taken from Table 6.5.

TABLE 6.23

ESTIMATED LIQUEFIED METHANE GAS PLANT EMISSIONS AT YEAR 100 WITH "CONDITIONED" MSW RESIDUE

SOURCE	EMISSIONS (lbs/day)				
	NO_X	ROG	PM_{10}	SO_X	CO
Liquefied Methane Gas Plant					
• Compressed Methane Plant Sources	164	128	8	1	33
• CO_2 Vent	0	41	0	0	0
TOTAL	164	169	8	1	33
Proposed Action					
• Stationary Sources(1)	460	140	10	200	30

91-296 (3/12/94/rb)

(1) Emissions taken from Table 6.6.

TABLE 6.24

MAXIMUM OFFSITE GROUND-LEVEL AIR POLLUTANT CONCENTRATIONS WITH "AS-RECEIVED" MSW RESIDUE

POLLUTANT	AVERAGING PERIOD	BACKGROUND CONCENTRATION ($\mu g/m^3$)	MAXIMUM PROJECT CONCENTRATION ($\mu g/m^3$)		TOTAL CONCENTRATION ($\mu g/m^3$)		CALIFORNIA AMBIENT AIR QUALITY STANDARDS ($\mu g/m^3$)	NATIONAL AMBIENT AIR QUALITY STANDARDS ($\mu g/m^3$)
			Year 16	Years 85/100	Year 16	Years 85/100		
NO_2	1-hour	73.3[1]	9.0	10.6	82.3	83.9	470	--
	Annual Arithmetic Mean	5.6[2]	0.1	0.2	5.7	5.8	--	100
SO_2	1-hour	Negligible	1.7	6.0	1.7	6.0	655	--
	3-hour	Negligible	1.5	5.4[3]	1.5	5.4	--	1,300
	24-hour	Negligible	0.3	1.4	0.3	1.4	131	365
	Annual Arithmetic Mean	Negligible	0.02	0.07	0.02	0.07	--	80
CO	1-hour	Negligible	1.4	0.06[4]	1.4	0.06	23,000	40,000
	8-hour	Negligible	1.0	0.04[4]	1.0	0.04	10,000	10,000
PM_{10}	24-hour	19.9[5]	27.4	22.2	47.3	42.1	50	150
	Annual Arithmetic Mean	19.9	2.7	4.4	22.6	24.3	--	50
	Annual Geometric Mean	18.1	2.7	1.7	20.8	19.8	30	--

91-296 (12/14/93/cm)

(1) Highest 1-hour concentration measured at Mesquite Mine well field on October 6, 1992, during a sampling program conducted from May 1992 through May 1993.
(2) Annual arithmetic mean measured at Mesquite Mine well field during the period May 1992 through May 1993.
(3) Estimated as 90 percent of the 1-hour mean SO_2 concentration computed with ISC2, where 0.9 is scaling factor approved by CARB and EPA (CAPCOA, 1987).
(4) Estimated as 70 percent of the 1-hour mean CO concentration computed with ISC2, where 0.7 is scaling factor approved by CARB and EPA (CAPCOA, 1987).
(5) Annual arithmetic mean is an appropriate background concentration to add to 24-hour maximum project concentration because the latter occurs under low wind speeds of 0.4 to 2.4 miles per hour, while high 24-hour background concentrations occur only with high wind speeds.

-- = None

TABLE 6.25

ESTIMATED MAXIMUM OFFSITE GROUND-LEVEL AIR POLLUTANT CONCENTRATIONS WITH "CONDITIONED" MSW RESIDUE

POLLUTANT	AVERAGING PERIOD	BACKGROUND CONCENTRATION ($\mu g/m^3$)	MAXIMUM PROJECT CONCENTRATION ($\mu g/m^3$)		TOTAL CONCENTRATION ($\mu g/m^3$)		CALIFORNIA AMBIENT AIR QUALITY STANDARDS ($\mu g/m^3$)	NATIONAL AMBIENT AIR QUALITY STANDARDS ($\mu g/m^3$)
			Year 16	Years 85/100	Year 16	Years 85/100		
NO_2	1-hour	73.3[(4)]	8.8	11.4	82.1	84.7	470	--
	Annual Arithmetic Mean	5.6[(5)]	0.1	0.2	5.7	5.8	--	100
SO_2	1-hour	Negligible	4.2	6.4	4.2	6.4	655	--
	3-hour	Negligible	3.8[(1)]	5.8[(1)]	3.8	5.8	--	1,300
	24-hour	Negligible	0.8	1.5	0.8	1.5	131	365
	Annual Arithmetic Mean	Negligible	0.05	0.08	0.05	0.08	--	80
CO	1-hour	Negligible	1.3	0.06	1.3	0.06	23,000	40,000
	8-hour	Negligible	0.9[(2)]	0.04[(2)]	0.9	0.04	10,000	10,000
PM_{10}	24-hour	19.9(3)	8	23.3	28.0	43.2	50	150
	Annual Arithmctic Mean	19.9	0.8	4.6	20.7	24.5	--	50
	Annual Geometric Mean	18.1	0.8	4.6	18.9	22.7	30	--

91-296 (3/12/94/rb)

(1) Estimated as 90 percent of the 1-hour mean SO_2 concentration computed with ISC2, where 0.9 is scaling factor approved by CARB and EPA (CAPCOA, 1987).

(2) Estimated as 70 percent of the 1-hour mean CO concentration computed with ISC2, where 0.7 is scaling factor approved by CARB and EPA (CAPCOA, 1987).

(3) Annual arithmetic mean is an appropriate background concentration to add to 24-hour maximum project concentration because the latter occurs under low wind speeds of 0.4 to 2.4 miles per hour, while high 24-hour background concentrations occur only with high wind speeds.

(4) Highest 1-hour concentration measured at Mesquite Mine well field on October 6, 1992, during a sampling program conducted from May 1992 through May 1993.

(5) Annual arithmetic mean measured at Mesquite Mine well field during the period May 1992 through May 1993.

-- = None

TABLE 6.26

SUMMARY OF HEALTH RISK[1]

BASED ON YEAR 16 EMISSIONS

SCENARIO	CARCINOGENIC RISK	ACUTE RISK HAZARD INDEX	CHRONIC RISK HAZARD INDEX
Long-Term (70-year) Exposure at Glamis Beach Store	5×10^{-8}	0.002	0.0002
14-Day Exposure at Property Boundary	5×10^{-10}	0.01	0.000002
12-Minute Daily Highway 78 Exposure for 40 Years	8×10^{-10}	0.003	0.000003
Acceptable Limit	10^{-5}	1.0	1.0

BASED ON YEAR 85/100 EMISSIONS

SCENARIO	CARCINOGENIC RISK	ACUTE RISK HAZARD INDEX	CHRONIC RISK HAZARD INDEX
Long-Term (70-year) Exposure at Glamis Beach Store	7×10^{-8}	0.0003	0.0002
14-Day Exposure at Property Boundary	9×10^{-10}	0.003	0.009
12-Minute Daily Highway 78 Exposure for 40 Years	1×10^{-9}	0.001	0.003
Acceptable Limit	10^{-5}	1.0	1.0

91-296 (3/12/94/rb)

(1) Risk estimated for exposure by inhalation pathway.

TABLE 6.27

TRAIN EMISSIONS AND AMBIENT AIR QUALITY IMPACTS IN COACHELLA VALLEY

AIR POLLUTANT	EMISSIONS (lb/hr)			RESULTING INCREASE IN AMBIENT CONCENTRATION[1] ($\mu g/m^3$)	BACKGROUND CONCENTRATION[2] ($\mu g/m^3$)	CAAQS CONCENTRATION AND AVERAGING TIME ($\mu g/m^3$)
	Per Locomotive	Per Train	Box (6 Trains)			
NO_x	91	364	2,184	1.6 (0.8 ppbv)	39[3]	470 (1-hour)
ROG	2.6	10.4	62.4	0.1	No Data	NA
PM_{10}	2	8	48	0.1	37[4]	50 (24-hour)
SO_x	1.4	5.6	33.6	0.07	No Data	131 (24-hour, as SO_2)
CO	9	36	216	0.5	No Data	10,000 (8-hour)
O_3	0	0	0	2 (1 ppbv)	80[5]	180 (1-hour)

91-296 (12/13/93/cm)

(1) Concentrations calculated with "box" model for 24 hours.
(2) Annual mean concentrations.
(3) Palm Springs Annual Arithmetic Mean NO_2 in 1991 (SCAQMD, 1992c).
(4) Palm Springs Annual Geometric Mean in 1991 (SCAQMD, 1992c).
(5) Palm Springs Annual Geometric Mean O_3 in 1991 (CARB 1992a).

NA = Not Applicable.

TABLE 6.28

COMPARISON[1] OF PROPOSED ACTION AND THREE CONCURRENT REGIONAL LANDFILLS MAXIMUM ANTICIPATED EMISSIONS FOR YEAR 16 (2009) WITH FLARES (lb/day)

I. SOCAB

ALTERNATIVES	NO_x	ROG	PM_{10}	SO_x	CO
Proposed Action	3,480	260	160	80	920
3 Regional Landfills at 30,000 tpd	5,220	390	240	120	1,380
3 Regional Landfills at 60,000 tpd	10,440	760	490	230	2,760
All Sources in SOCAB[2] (1987)	2,400,000	2,800,000	2,200,000	270,000	10,000,000

II. COACHELLA VALLEY

ALTERNATIVES	NO_x	ROG	PM_{10}	SO_x	CO
Proposed Action	2,680	120	80	60	380
3 Regional Landfills at 30,000 tpd	4,030	180	120	90	590
3 Regional Landfills at 60,000 tpd	8,050	360	240	180	1,180
All Sources in Coachella Valley (1987)[2]	134,000	336,000	915,000[3]	17,000	1,170,000

III. RIVERSIDE COUNTY OUTSIDE COACHELLA VALLEY

ALTERNATIVES	NO_x	ROG	PM_{10}	SO_x	CO
Proposed Action	0	0	0	0	0
Eagle Mountain Project at 10,000 tpd	2,120	350	250	120	1,080
Eagle Mountain Project at 20,000 tpd	3,640	600	440	200	1,660

IV. IMPERIAL COUNTY

ALTERNATIVES	NO_x	ROG	PM_{10}	SO_x	CO
Proposed Action	4,190	620	460	220	1,790
3 Regional Landfills and Trains at					
• 30,000 tpd	4,440	710	510	240	2,240
• 60,000 tpd	7,680	1,220	900	420	3,480
All Sources in Imperial County (1987)[4]	61,600	57,000	3,700,000	3,600	250,000

91-296 (3/12/94/rb)

(1) Emissions between MSW generators and transfer/compactor stations are identical for Proposed Action and No Action alternatives. After the trucks leave these stations, the emissions are summed to provide the values in this table.
(2) SCAQMD, 1991a.
(3) SCAQMD, 1990a.
(4) Imperial County Air Quality Attainment Plan, 1992a.

TABLE 6.29

POTENTIAL CHANGES IN CRITERIA POLLUTANT CONCENTRATIONS IN COACHELLA VALLEY

POLLUTANT	MOST PROBABLE SCENARIO INCREASE (PERCENT)	WORST-CASE SCENARIO INCREASE (PERCENT)
NO_x	3	6
ROG	0.06	0.12
PM_{10}	0.03	0.05
SO_x	0.53	1.06
CO	0.06	0.13

91-296 (3/12/94/rb)

TABLE 6.30

MAXIMUM OFFSITE GROUND-LEVEL AIR POLLUTANT CONCENTRATIONS ESTIMATED FOR ALTERNATIVE IV - LARGER LANDFILL PROJECT

POLLUTANT	AVERAGING PERIOD	BACKGROUND CONCENTRATION (μg/m³)	MAXIMUM PROJECT CONCENTRATION (μg/m³)	TOTAL CONCENTRATION (μg/m³)	CALIFORNIA AMBIENT AIR QUALITY STANDARDS (μg/m³)	NATIONAL AMBIENT AIR QUALITY STANDARDS (μg/m³)
			Year 73	Year 73		
NO_2	1-hour	73.3[(1)]	15.3	85.8	470	--
	Annual Arithmetic Mean	5.6[(2)]	0.3	6	--	100
SO_2	1-hour	Negligible	9	9	655	--
	3-hour	Negligible	8[(3)]	8	--	1,300
	24-hour	Negligible	2.1	2.1	131	365
	Annual Arithmetic Mean	Negligible	0.1	0.1	--	80
CO	1-hour	Negligible	0.08	0.08	23,000	40,000
	8-hour	Negligible	0.06[(5)]	0.06	10,000	10,000
PM_{10}	24-hour	19.9[(4)]	28.4	48.3	50	150
	Annual Arithmetic Mean	19.9	5.8	25.7	--	50
	Annual Geometric Mean	18.1	5.8	23.9	30	--

91-296 (3/14/94/rb)

(1) Highest 1-hour concentration measured at Mesquite Mine well field on October 6, 1992, during a sampling program conducted from May 1992 through May 1993.
(2) Annual arithmetic mean measured at Mesquite Mine well field during the period May 1992 through May 1993.
(3) Estimated as 90 percent of the 1-hour mean SO_2 concentration computed with ISC2, where 0.9 is scaling factor approved by CARB and EPA (CAPCOA, 1987).
(4) Annual arithmetic mean is an appropriate background concentration to add to 24-hour maximum project concentration because the latter occurs under low wind speeds of 0.4 to 2.4 miles per hour, while high 24-hour background concentrations occur only with high wind speeds.
(5) Estimated as 70 percent of the 1-hour mean CO concentration computed with ISC2, where 0.7 is scaling factor approved by CARB and EPA (CAPCOA, 1987).

-- = None

TABLE 6.31

SIGNIFICANCE OF POTENTIAL AIR QUALITY IMPACTS

POLLUTION TYPE	MEASURE OF SIGNIFICANCE	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Criteria Air Pollutants	Violation of NAAQS.	No
	Violation of CAAQS, including visibility-reducing particles.	No
	Substantial contribution to existing or projected violation of AAQS.	No
	Increase in frequency of existing violation of AAQS.	No
	Substantial contribution to a delay in attaining an AAQS.	No
Toxic Air Pollutants	Carcinogenic health risk.	Less than 10^{-5}.
	Chronic health risk.	Chronic risk hazard index <1.0.
	Acute health risk.	Acute risk hazard index <1.0.
Odor	Noticeable at residential/commercial facilities.	No
All	Determination that Proposed Action is inconsistent with a CARB-approved AQAP, including visibility protection.	No

91-296 (3/12/94/rb)

FIGURES

91-296 REVAQTR REV. 1/18/93

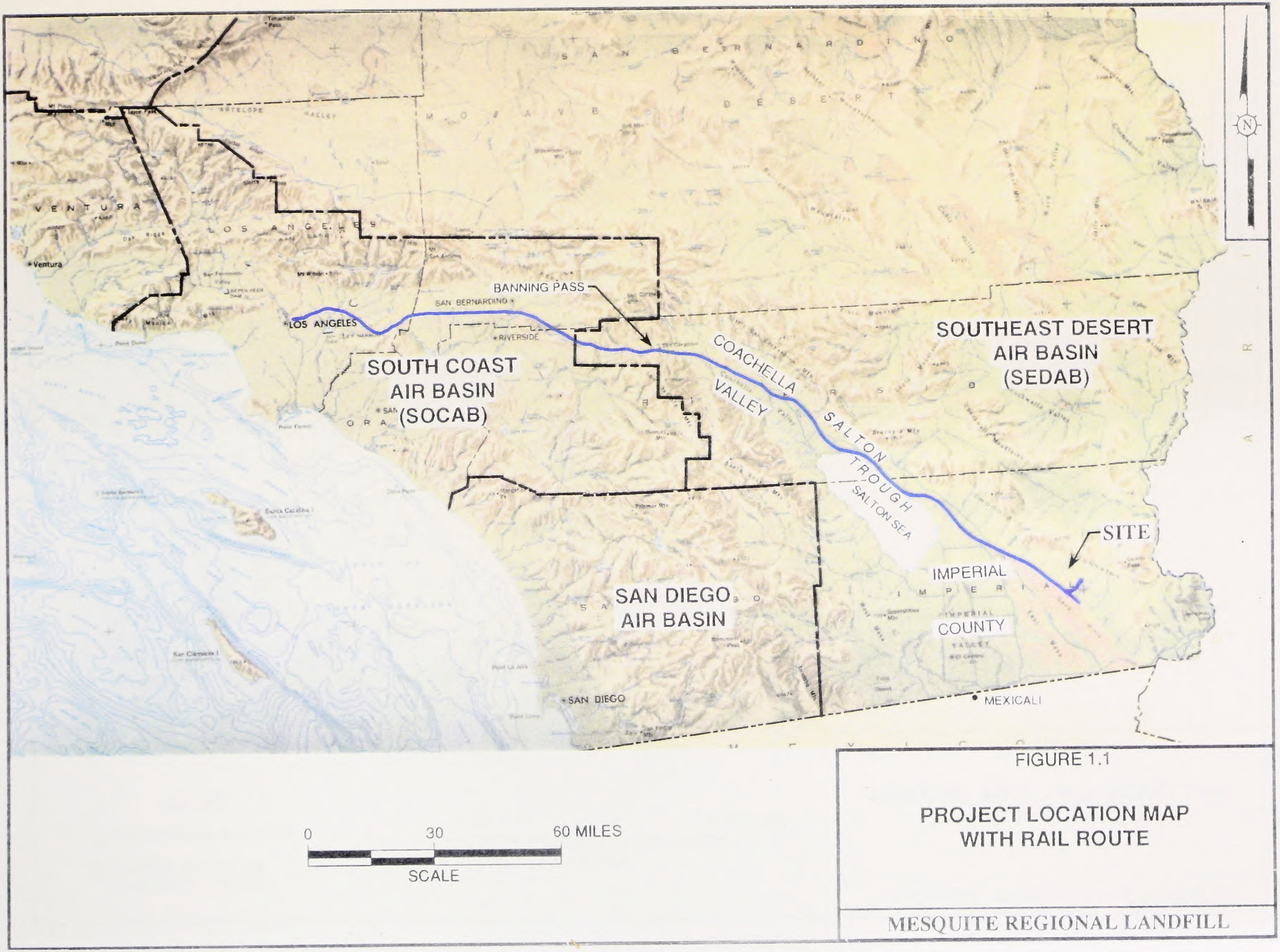


FIGURE 1.1

PROJECT LOCATION MAP WITH RAIL ROUTE

MESQUITE REGIONAL LANDFILL

91-296 REVAQTR-16 REV. 8/28/93

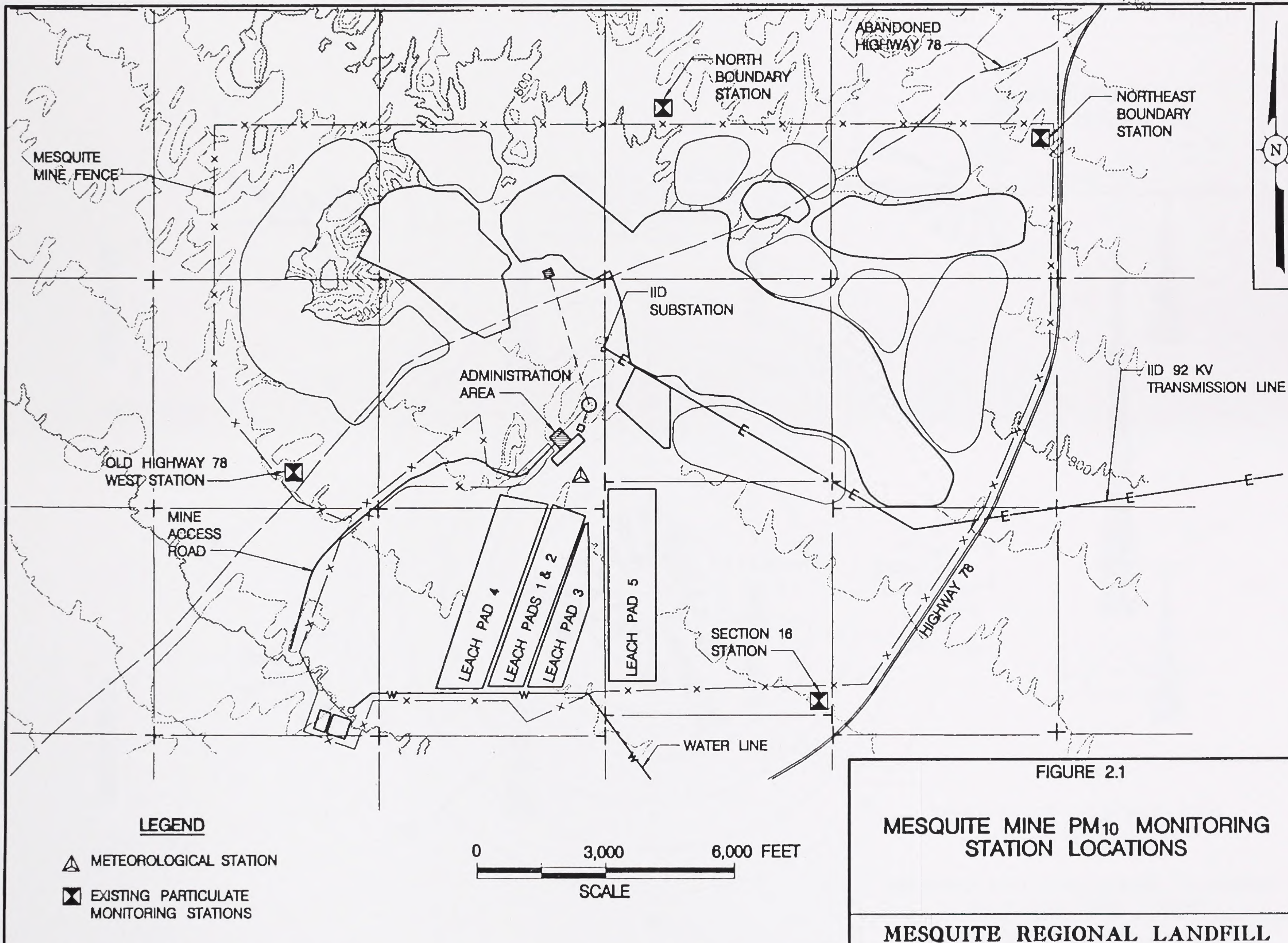
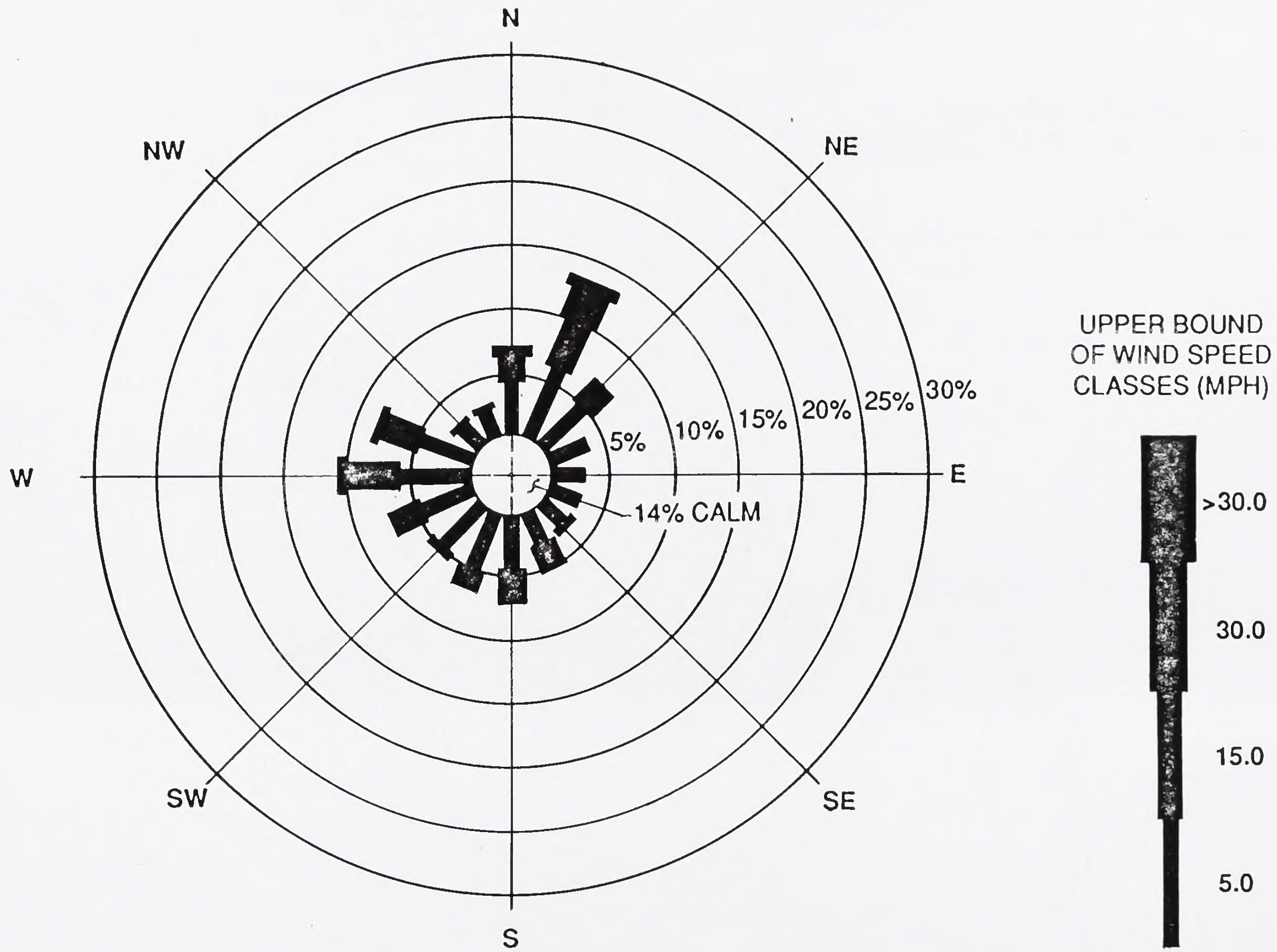


FIGURE 2.1

MESQUITE MINE PM_{10} MONITORING STATION LOCATIONS

MESQUITE REGIONAL LANDFILL

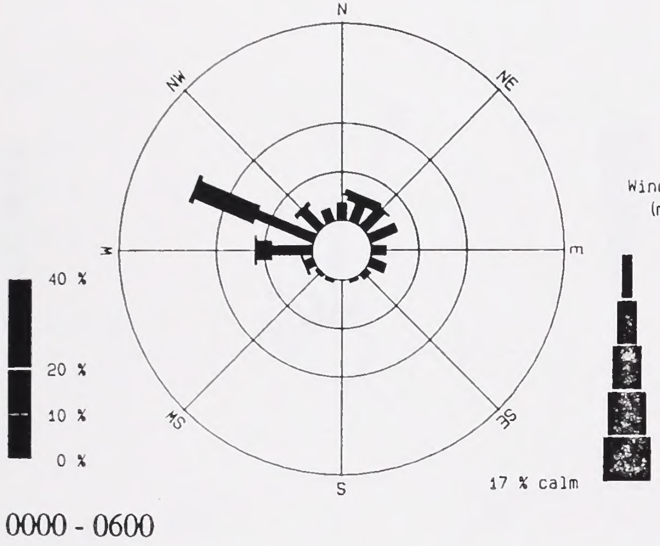


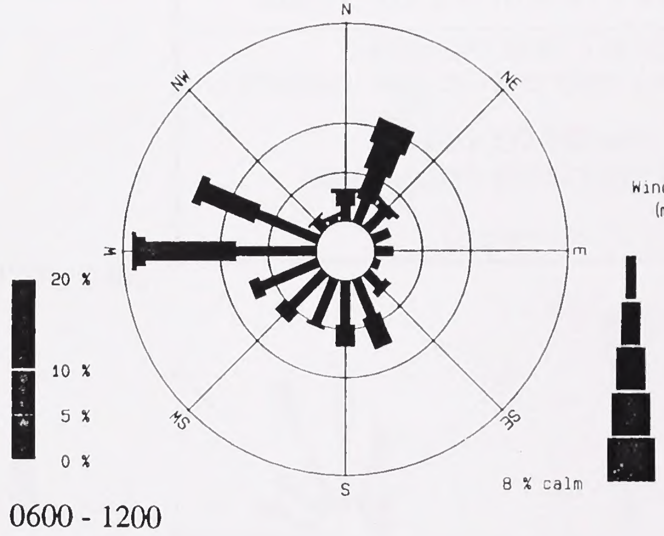
AVERAGING TIME: 1 HOUR
MESQUITE, CALIFORNIA
WIND ROSE ANALYSIS
FOR 4/1/91 TO 3/31/92

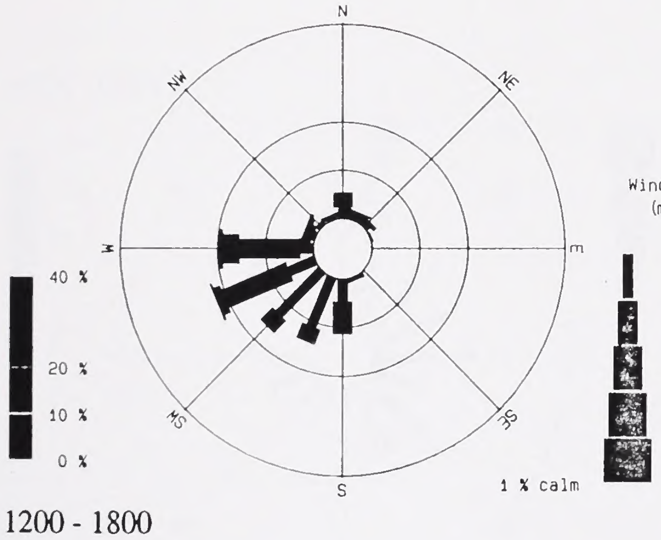
FIGURE 2.2

ANNUAL WIND ROSE FOR MESQUITE MINE

MESQUITE REGIONAL LANDFILL







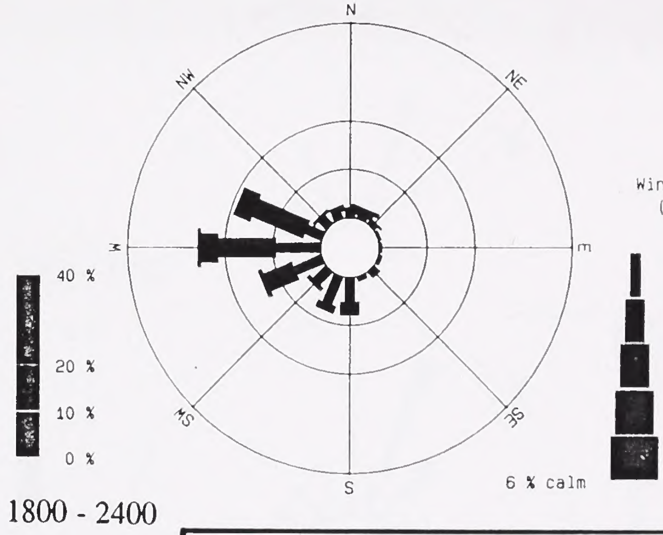


FIGURE 2.3

WIND ROSE ANALYSIS FOR 4/01/91 TO 6/30/91

MESQUITE MINE NEAR GLAMIS, CALIFORNIA
AVERAGING TIME: 1 HOUR

MESQUITE REGIONAL LANDFILL

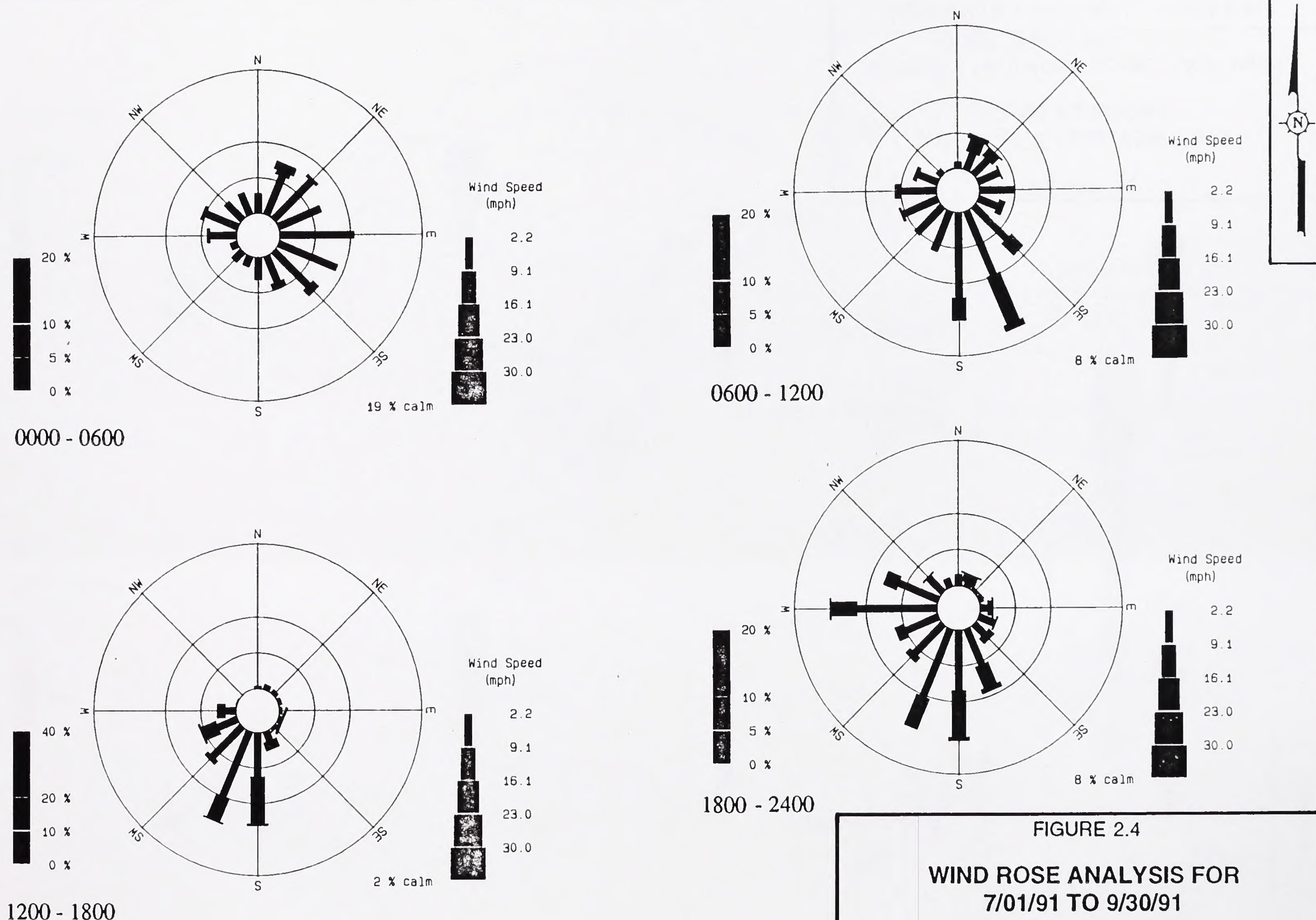


FIGURE 2.4

WIND ROSE ANALYSIS FOR 7/01/91 TO 9/30/91

MESQUITE MINE NEAR GLAMIS, CALIFORNIA
AVERAGING TIME: 1 HOUR

MESQUITE REGIONAL LANDFILL

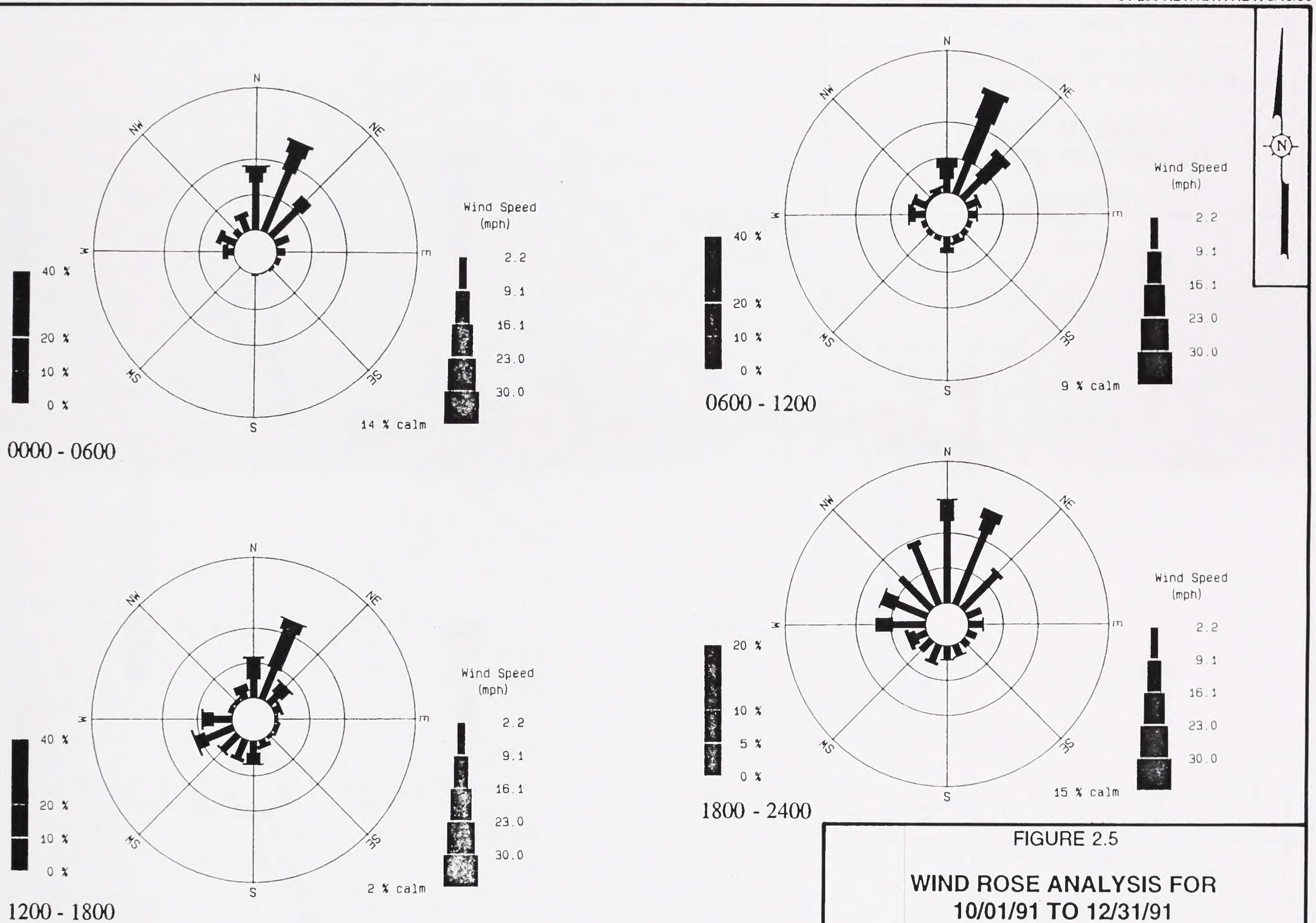


FIGURE 2.5

WIND ROSE ANALYSIS FOR 10/01/91 TO 12/31/91

MESQUITE MINE NEAR GLAMIS, CALIFORNIA
AVERAGING TIME: 1 HOUR

MESQUITE REGIONAL LANDFILL

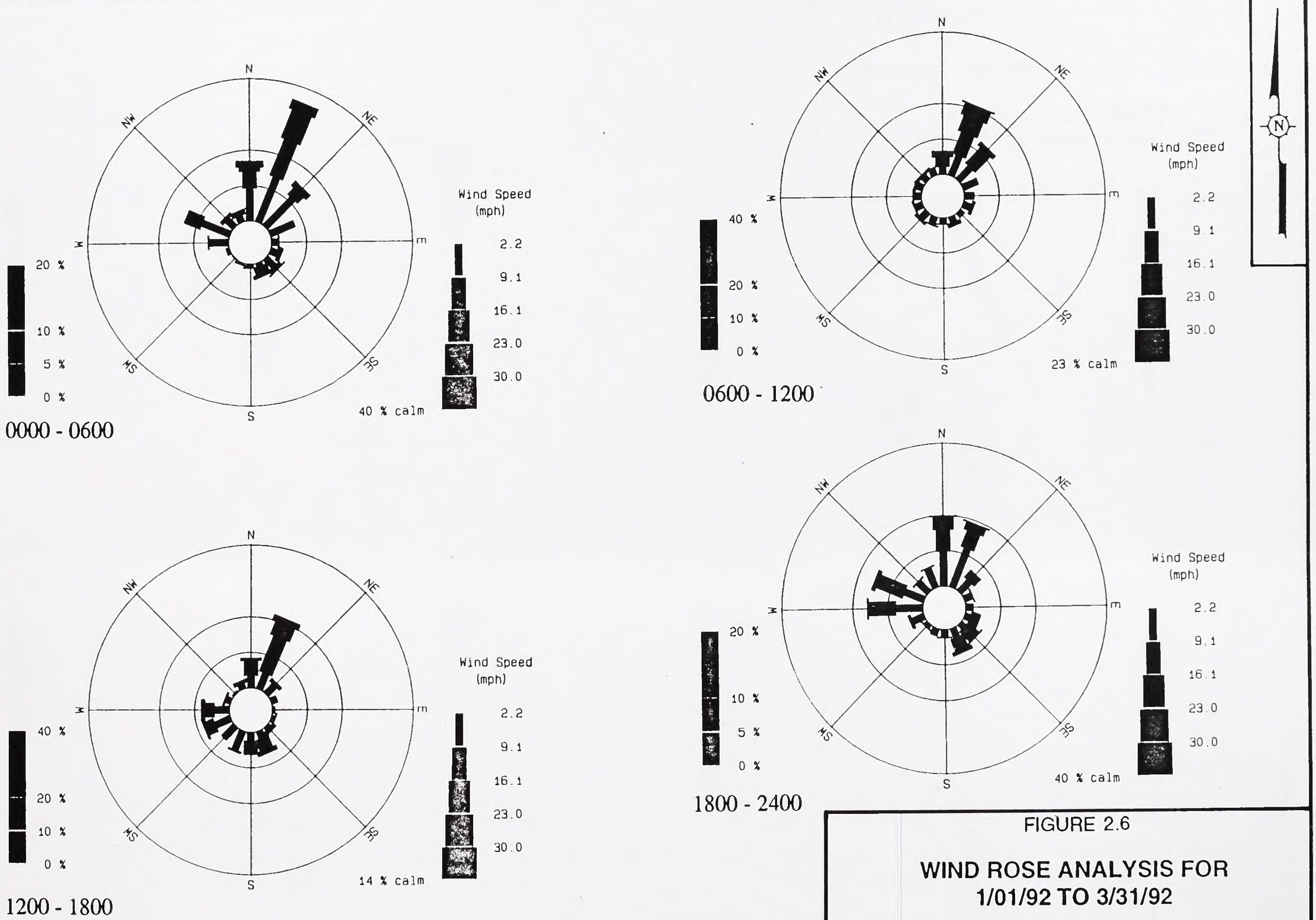


FIGURE 2.6

WIND ROSE ANALYSIS FOR 1/01/92 TO 3/31/92

MESQUITE MINE NEAR GLAMIS, CALIFORNIA
AVERAGING TIME: 1 HOUR

MESQUITE REGIONAL LANDFILL

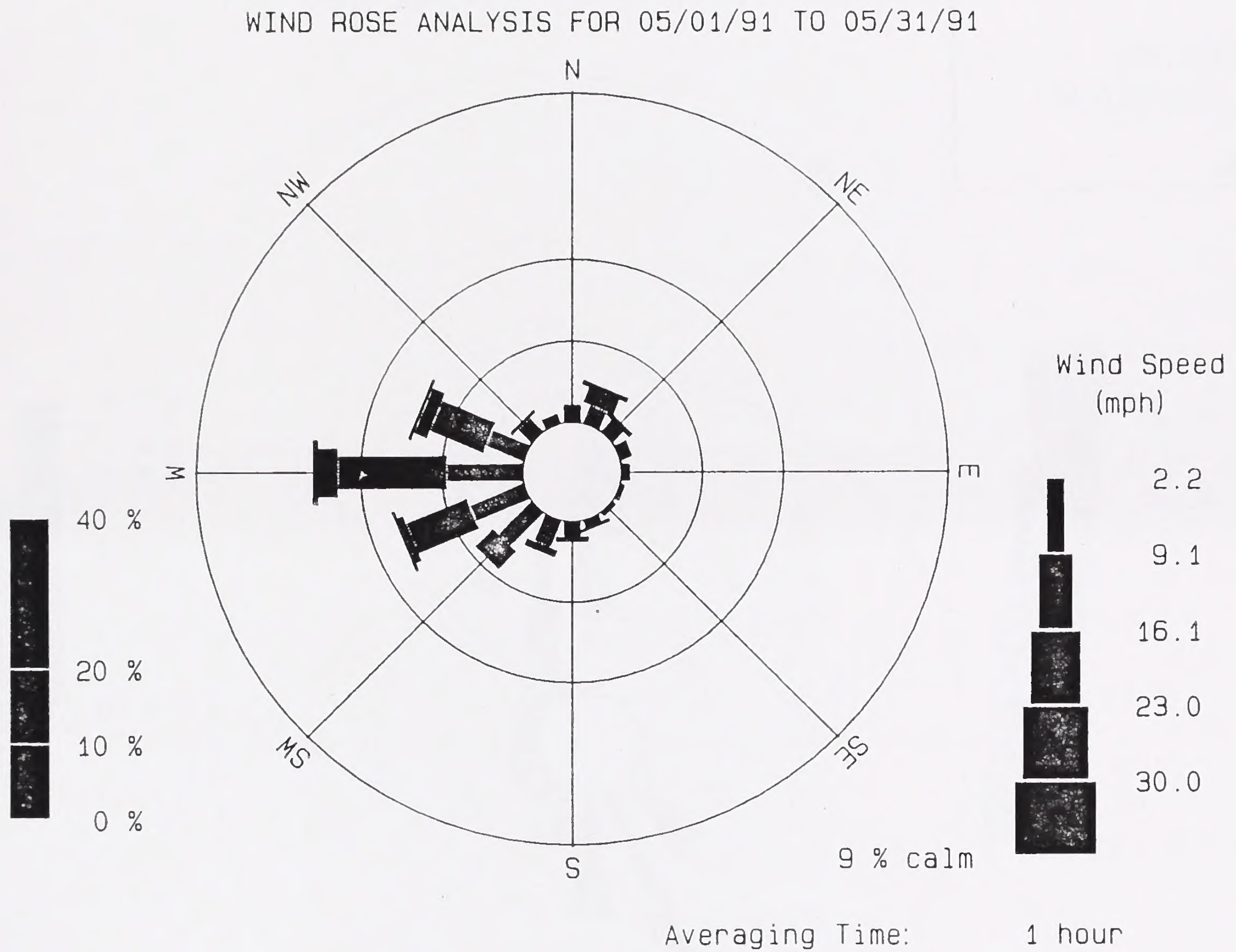


FIGURE 2.7

MAY 1991 WIND ROSE FOR MESQUITE MINE

MESQUITE REGIONAL LANDFILL

136391

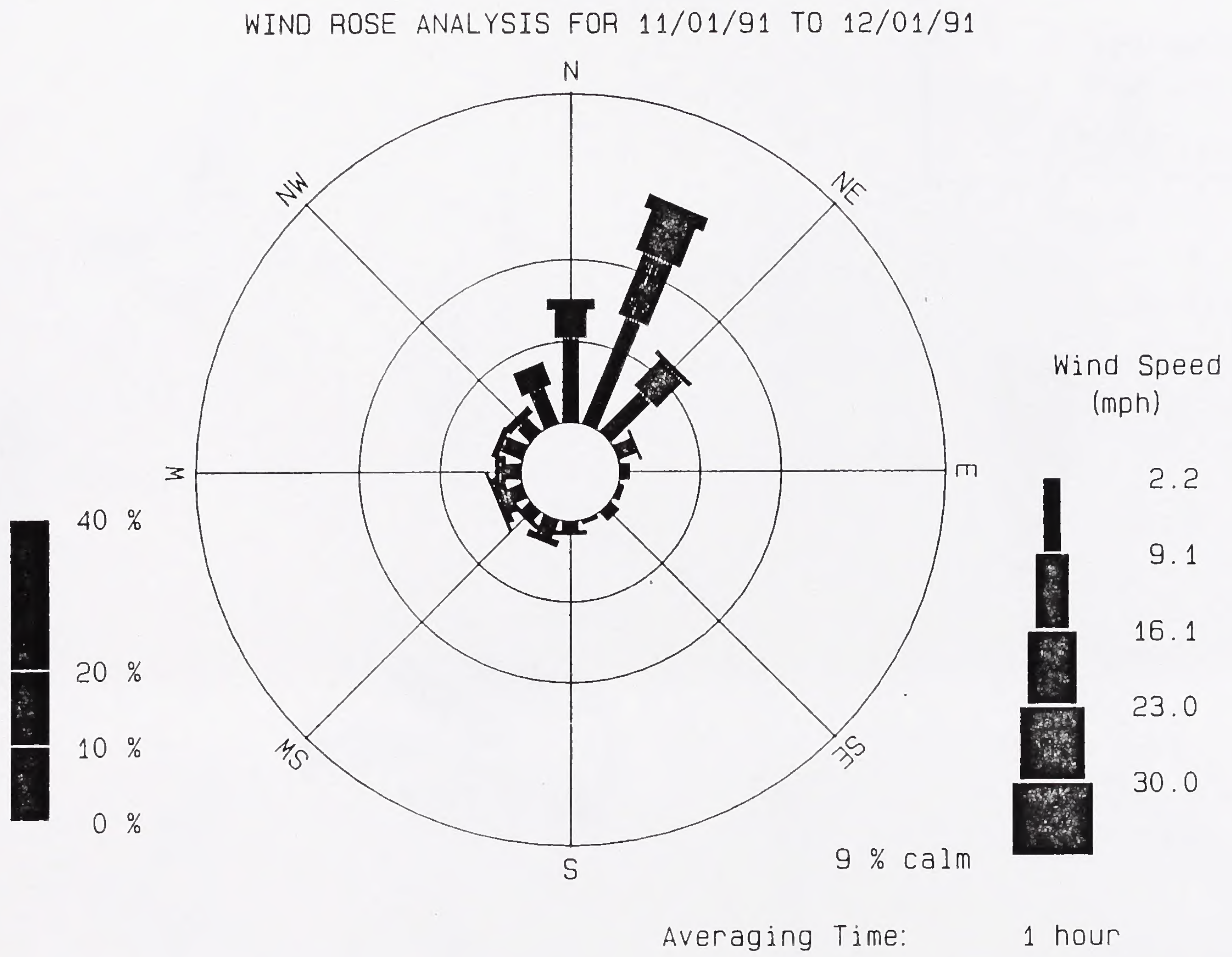


FIGURE 2.8

NOVEMBER 1991 WIND ROSE FOR MESQUITE MINE

MESQUITE REGIONAL LANDFILL

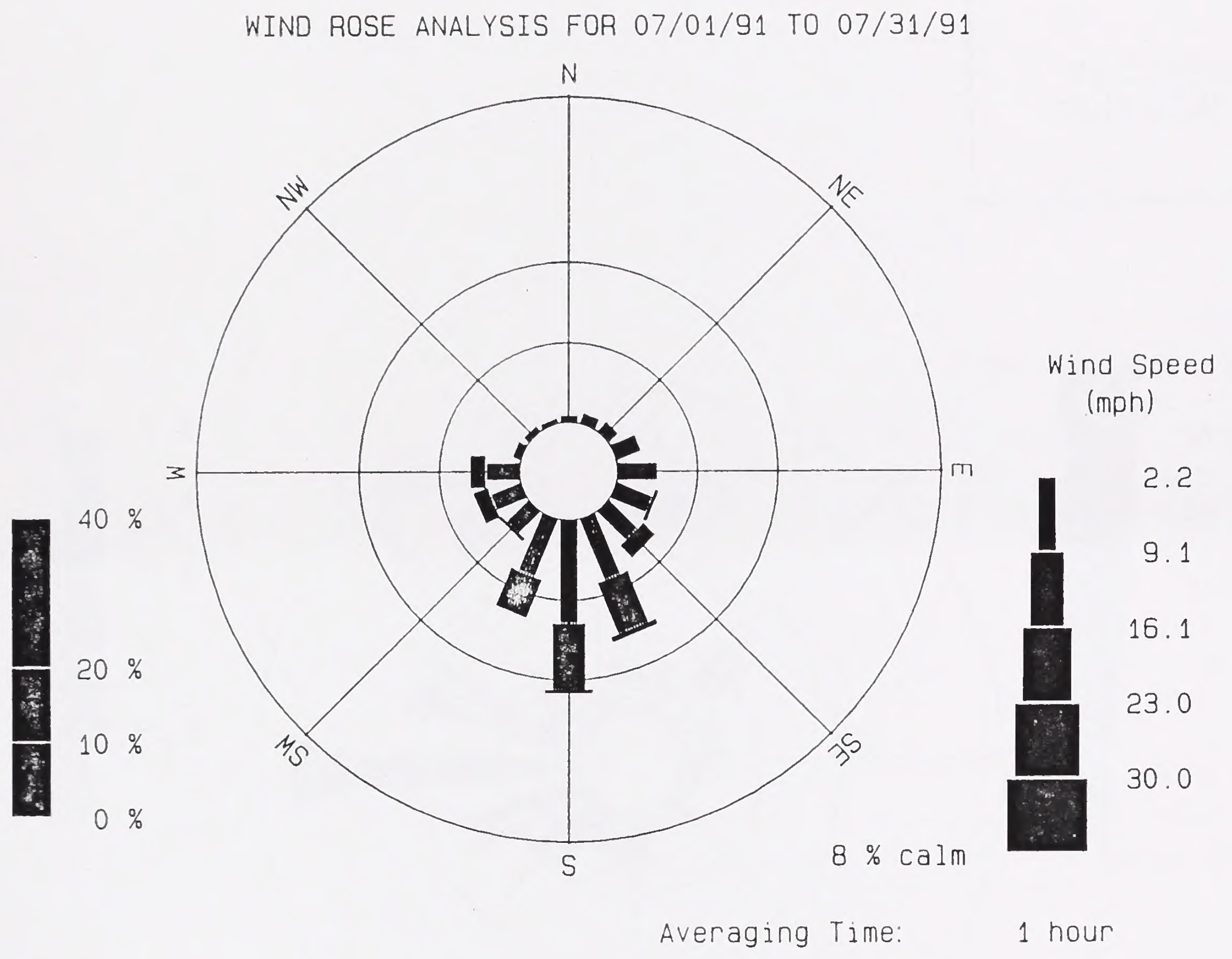


FIGURE 2.9

JULY 1991 WIND ROSE FOR MESQUITE MINE

MESQUITE REGIONAL LANDFILL

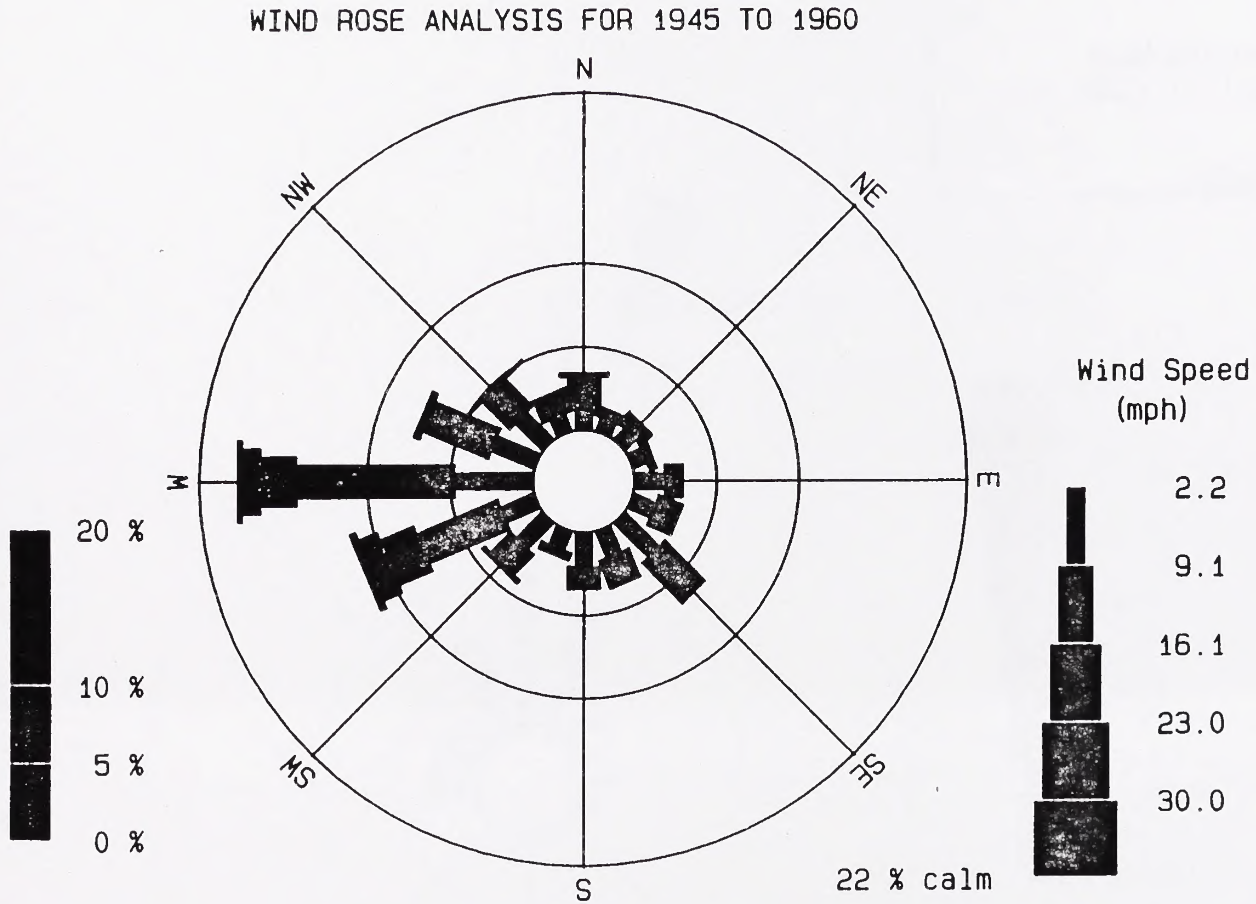


FIGURE 2.10

WIND ROSE FOR 1945 TO 1960
AT EL CENTRO, CALIFORNIA

MESQUITE REGIONAL LANDFILL

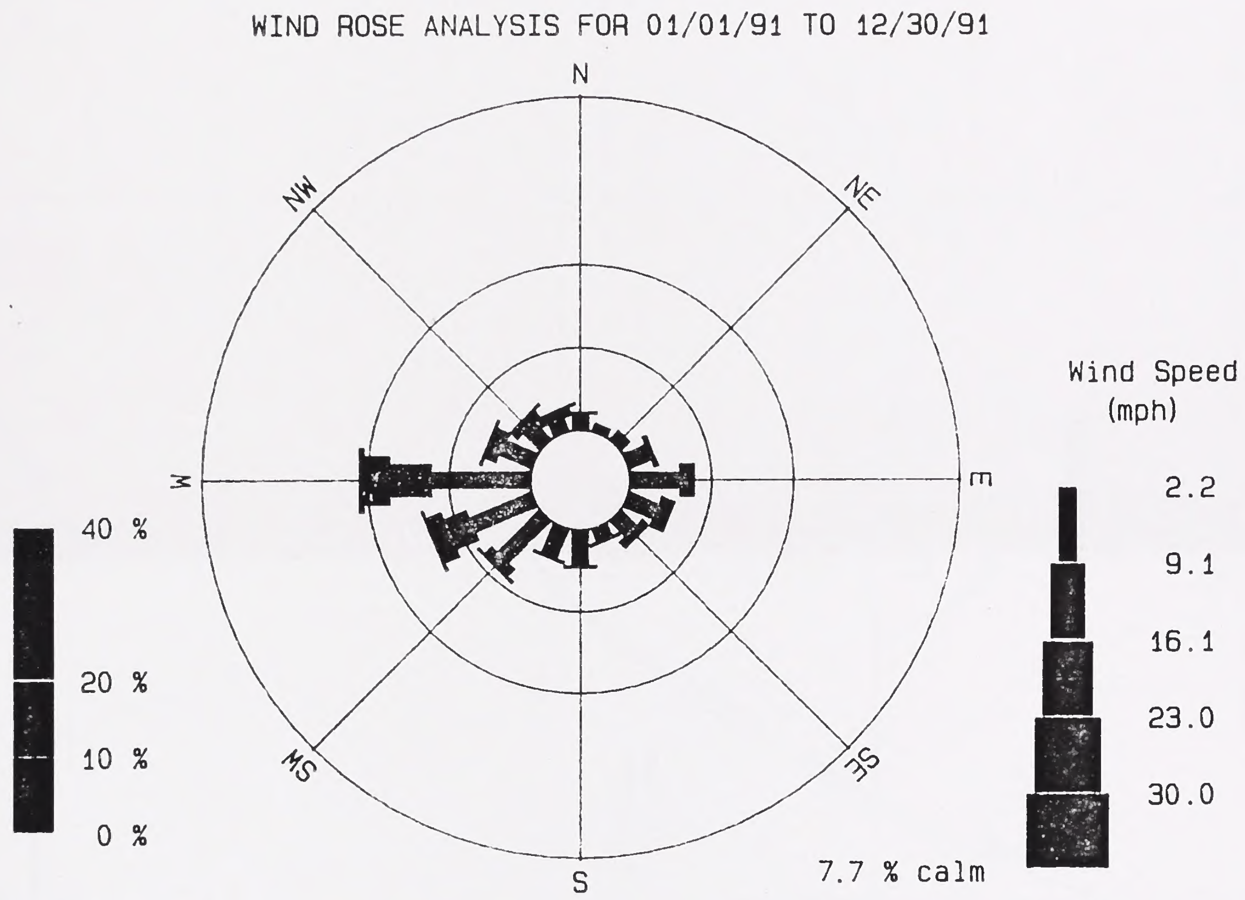


FIGURE 2.11

1991 ANNUAL WIND ROSE
FOR IMPERIAL, CALIFORNIA

MESQUITE REGIONAL LANDFILL

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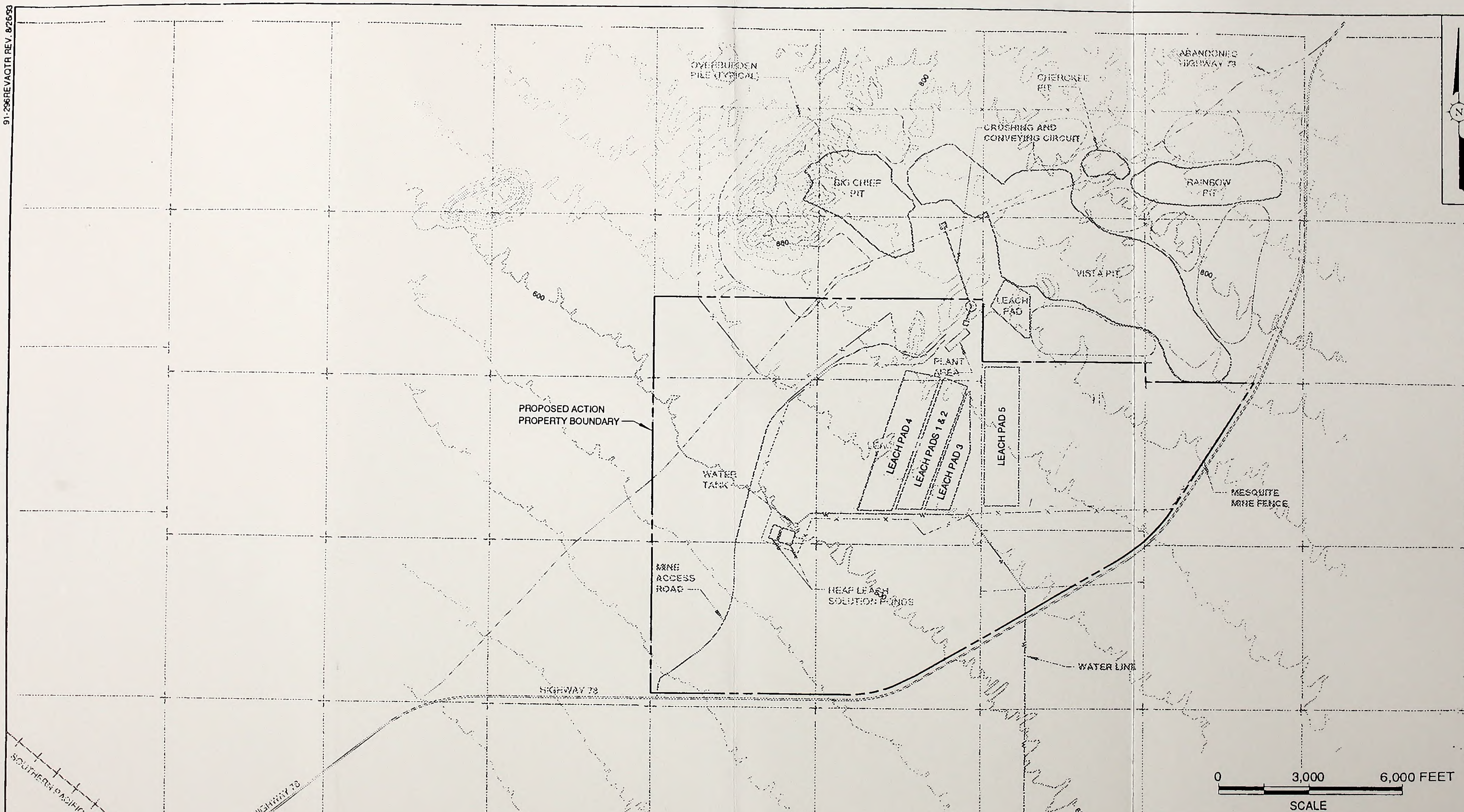


FIGURE 2.12

O_3 AND NO_x MONITORING SITE

MESQUITE REGIONAL LANDFILL

91-296 REVAQTR REV. 8/19/93

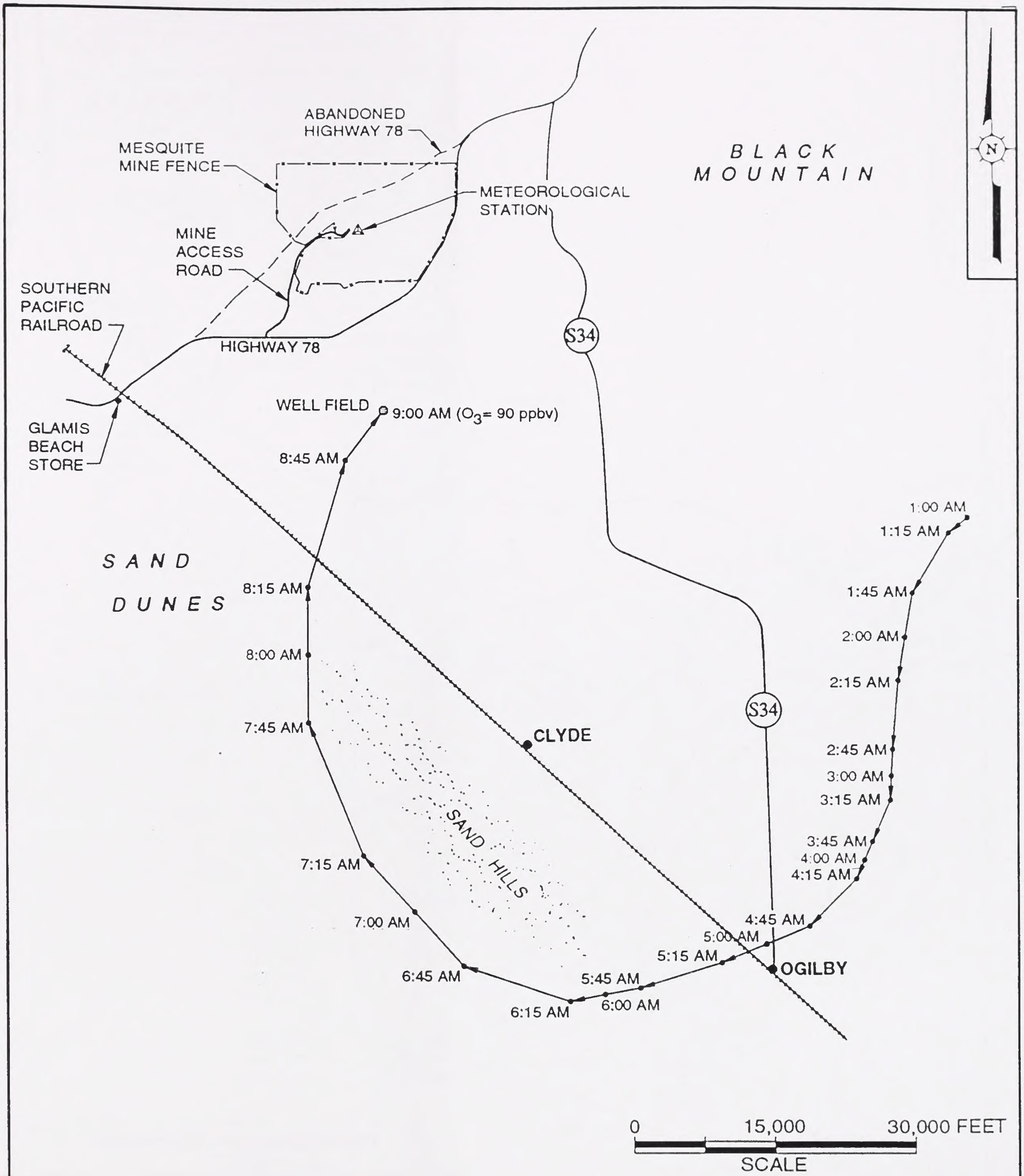


FIGURE 2.13

BACK TRAJECTORY FOR JULY 17, 1992 (FRIDAY)

MESQUITE REGIONAL LANDFILL

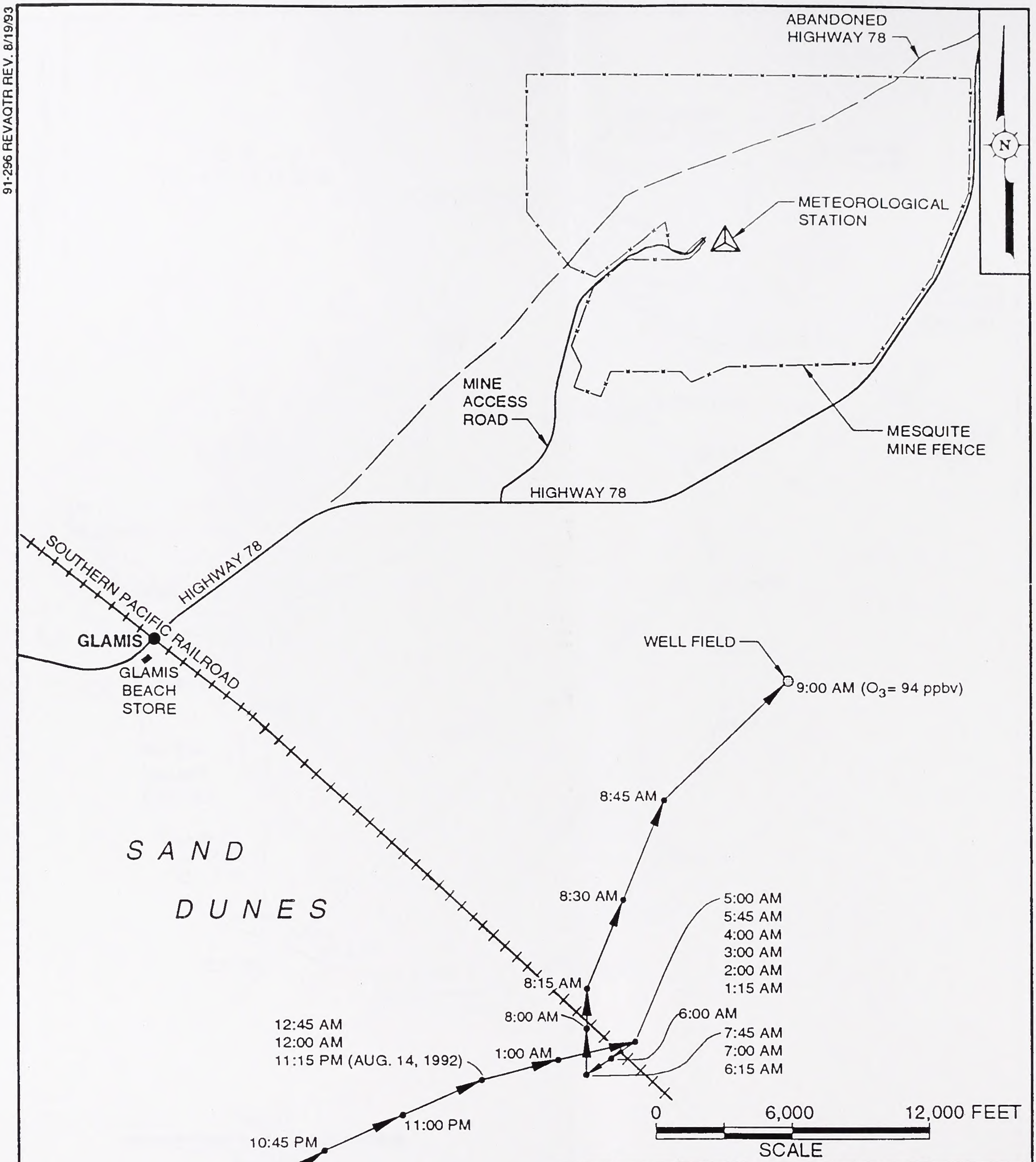


FIGURE 2.14

BACK TRAJECTORY FOR AUGUST 15, 1992 (SATURDAY)

MESQUITE REGIONAL LANDFILL

91:296REVAQTR REV. 8/26/93

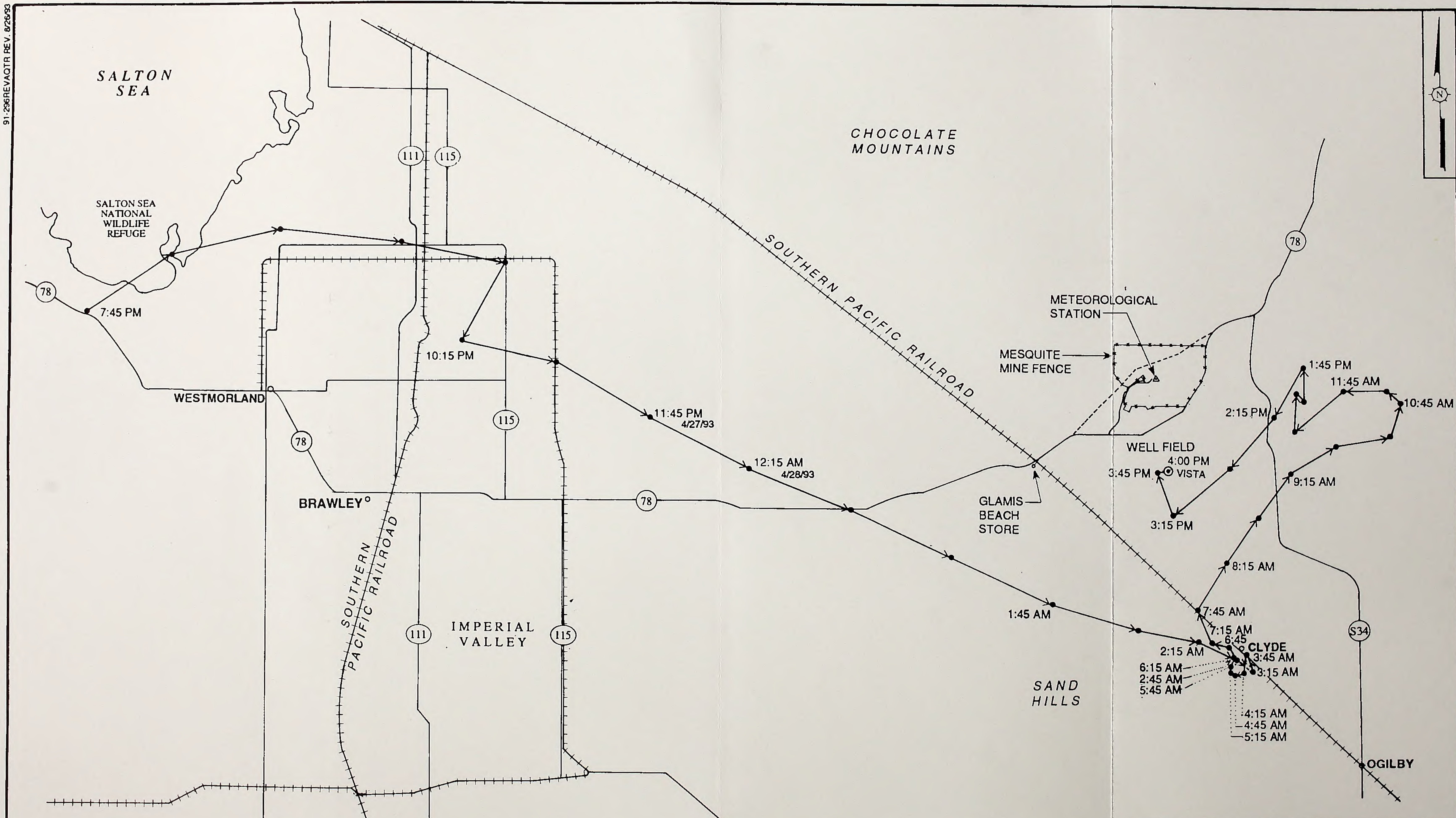


FIGURE 2.15

BACK TRAJECTORY FOR APRIL 28, 1993 (WEDNESDAY)

MESQUITE REGIONAL LANDFILL

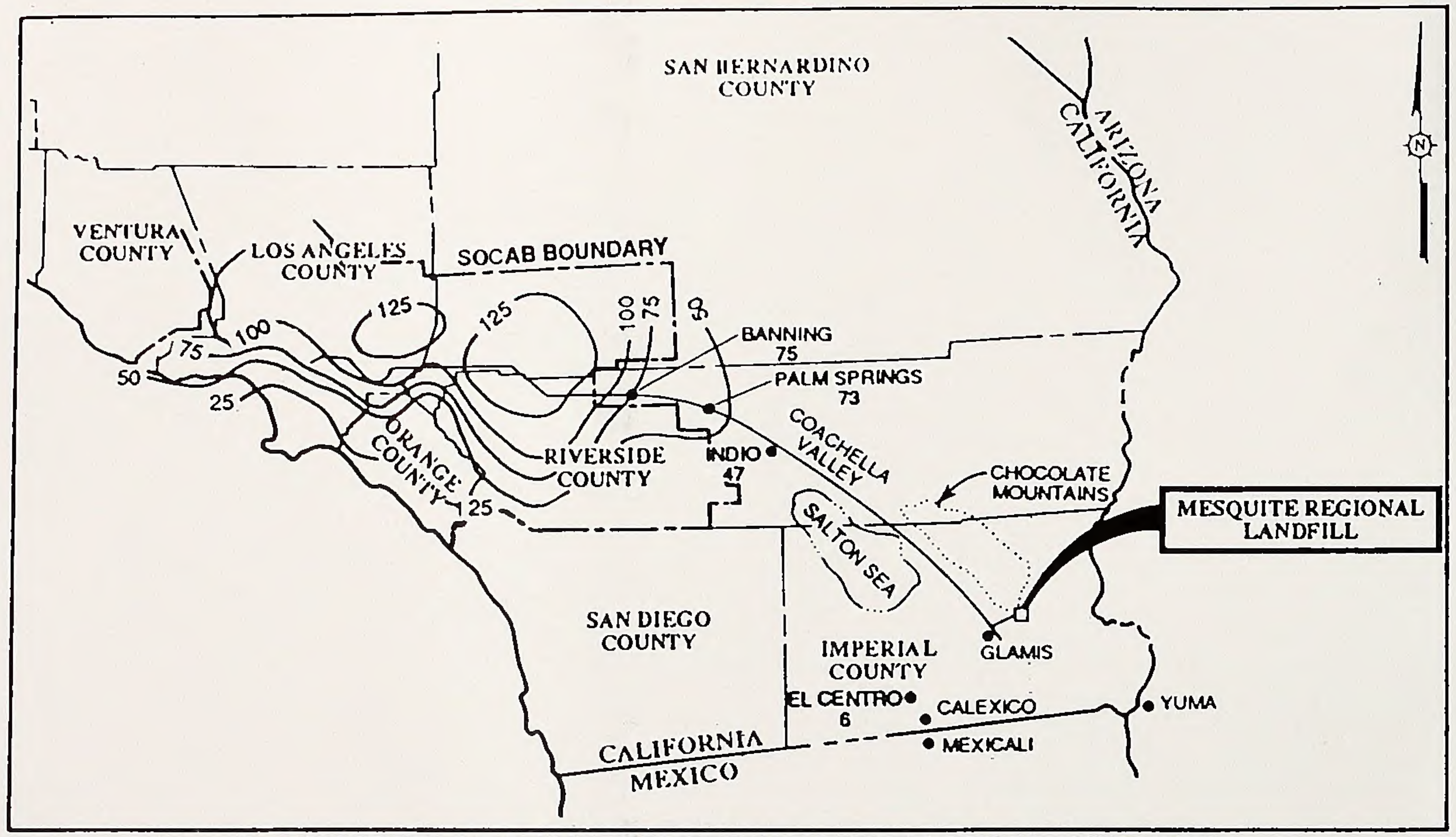
FIGURE 2.16

SCAQMD MONITORING STATIONS

MESQUITE REGIONAL LANDFILL

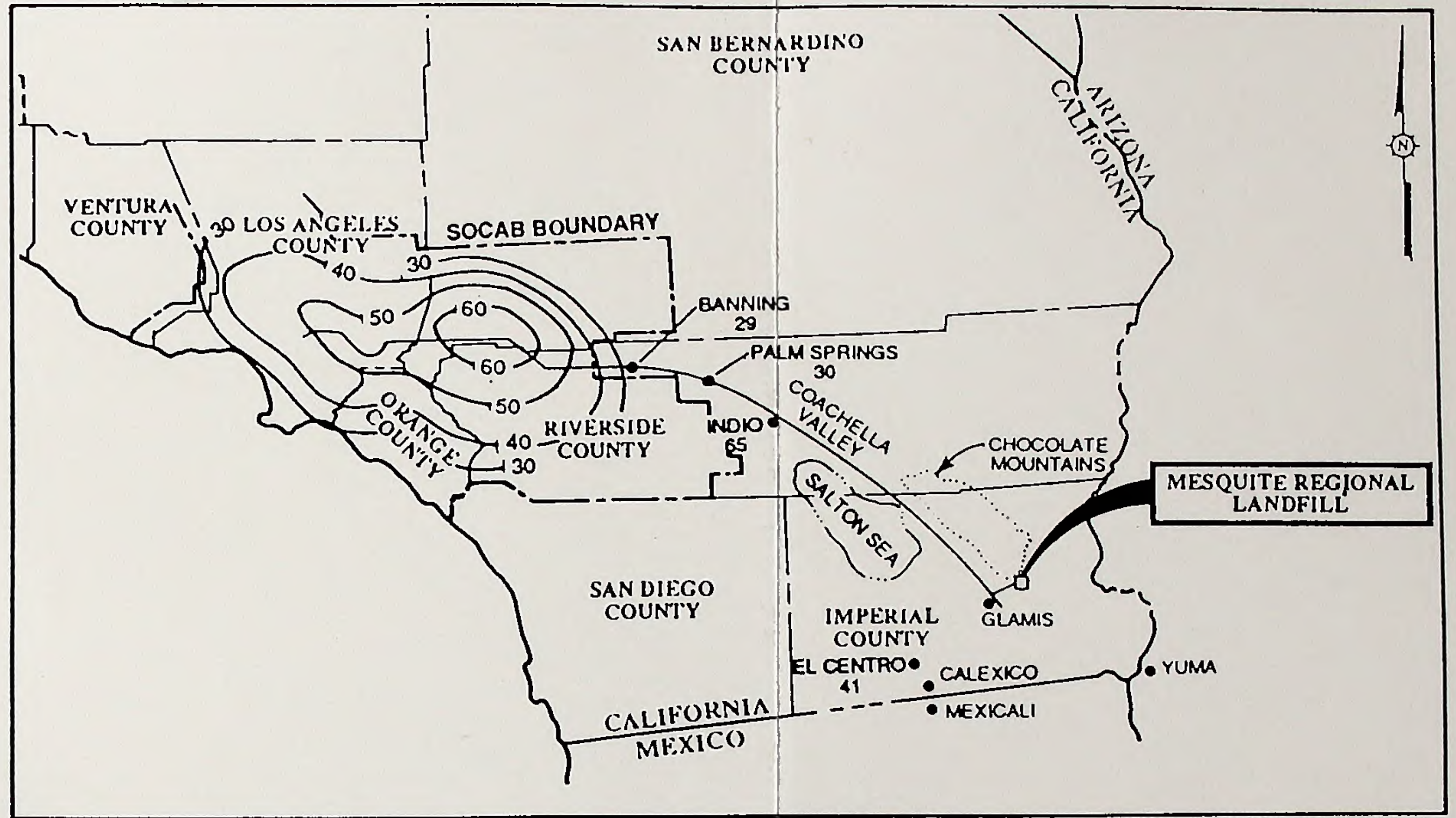
REFERENCE: SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (1991b).

91-296 REVAQTR REV. 8/19/93



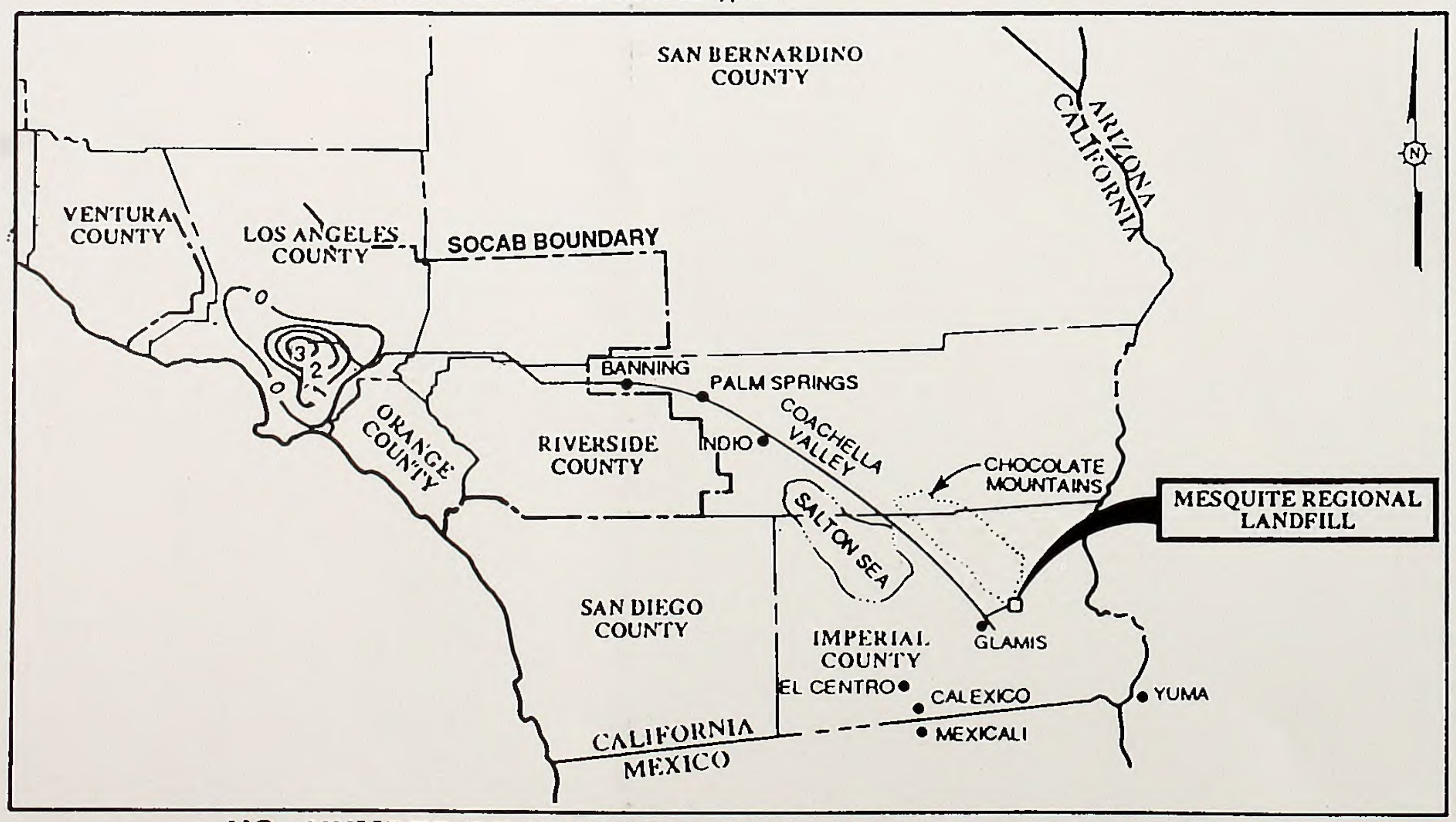
O_3 NUMBER OF DAYS EXCEEDING STATE STANDARD 1990

NOTE: 1-HOUR AVERAGE CONCENTRATION >0.09 ppm.



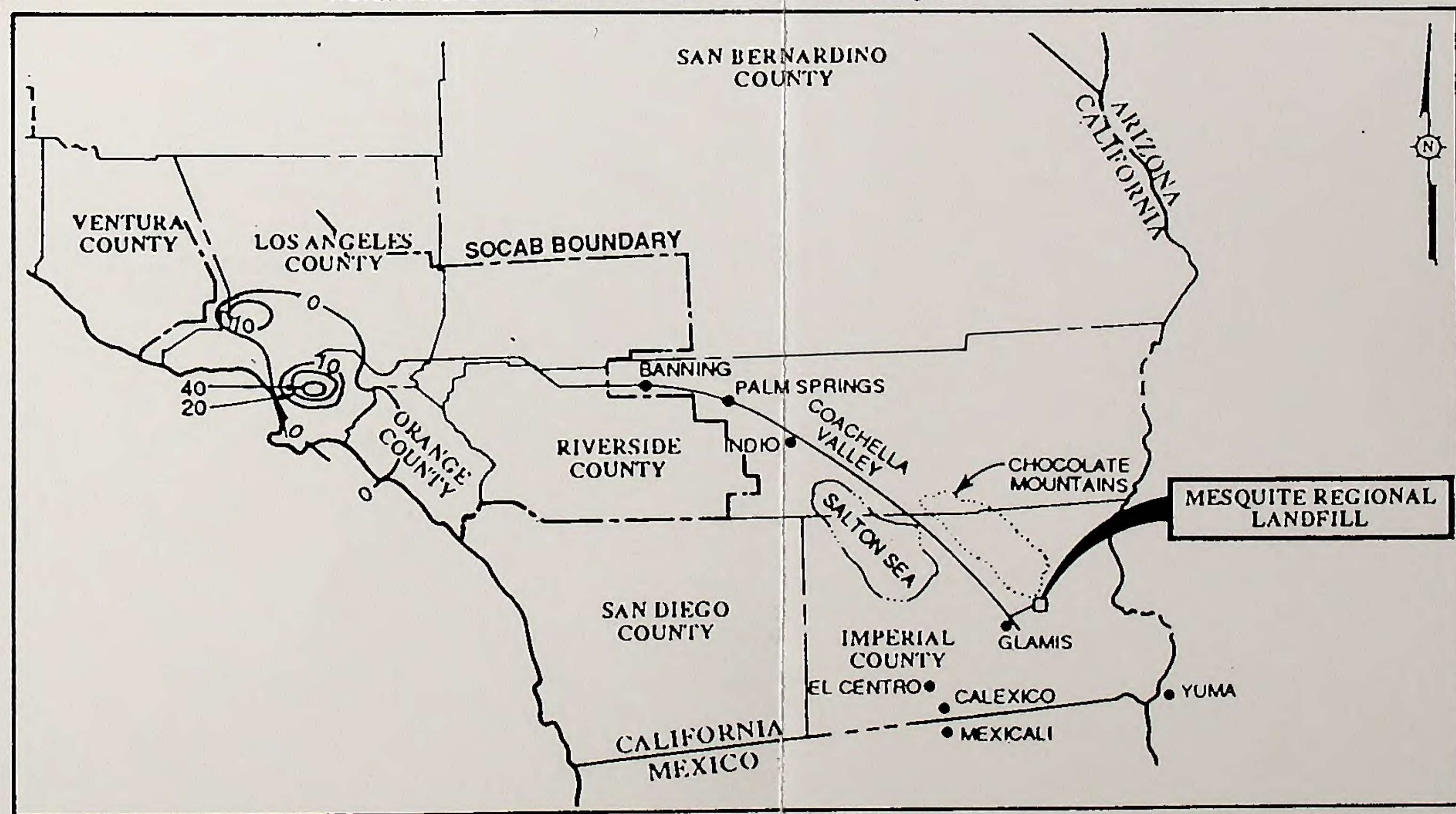
PM_{10} ANNUAL AVERAGE CONCENTRATION 1990

NOTE: ANNUAL GEOMETRIC MEAN CONCENTRATION >30 mg/m ^{3}.



NO_2 NUMBER OF DAYS EXCEEDING STATE STANDARD 1990

NOTE: 1-HOUR AVERAGE CONCENTRATION >0.25 ppm.



CO NUMBER OF DAYS EXCEEDING STATE STANDARD 1990

NOTE: 8-HOUR AVERAGE CONCENTRATION >9.00 ppm.

LEGEND

125 — DAYS OF EXCEEDANCE IN SCAB

EL CENTRO 6 — DAYS OF EXCEEDANCE AT INDIVIDUAL STATIONS

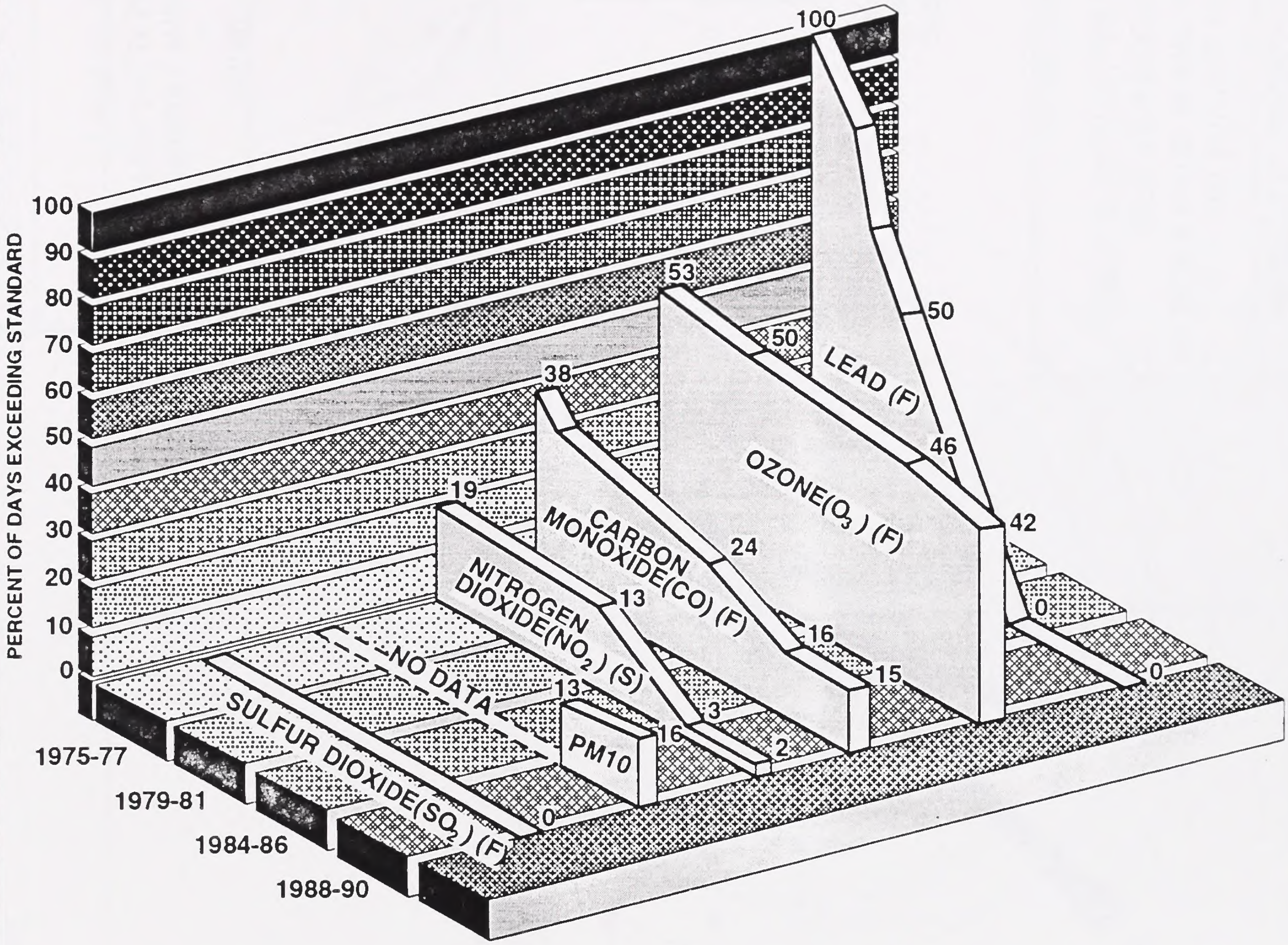
0 50 100 MILES

SCALE

FIGURE 2.17

NUMBER OF EXCEEDANCE DAYS IN SOCAB 1990

MESQUITE REGIONAL LANDFILL



NOTE:

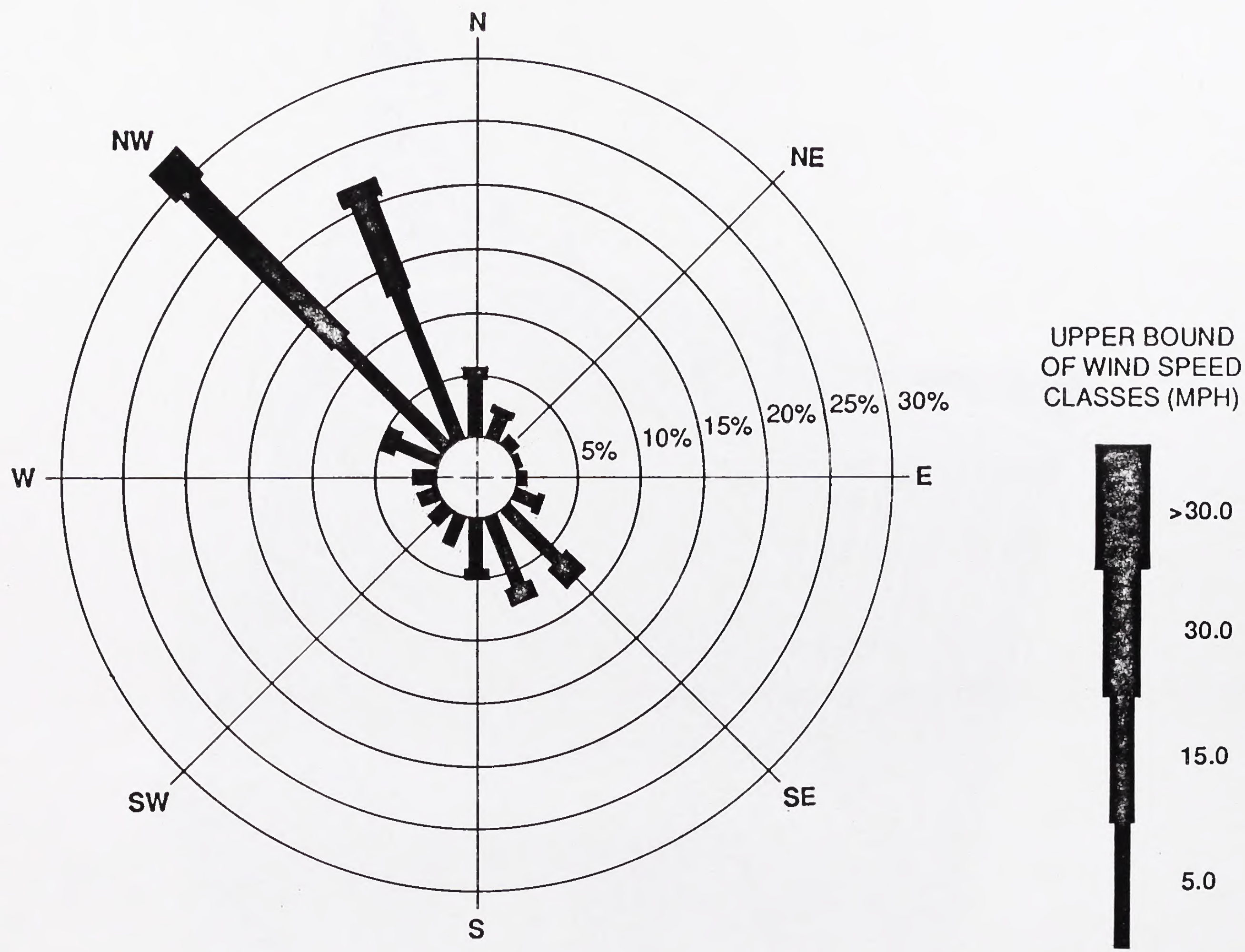
(F) = FEDERAL
(S) = STATE

SOURCE: SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (1991a).

FIGURE 2.18

PERCENT OF DAYS EXCEEDING FEDERAL OR STATE STANDARD 1975 - 1990

MESQUITE REGIONAL LANDFILL



SOURCE: SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (1990a).

FIGURE 2.19

ANNUAL WIND ROSE
FOR PALM SPRINGS
(1986 TO 1988)

MESQUITE REGIONAL LANDFILL

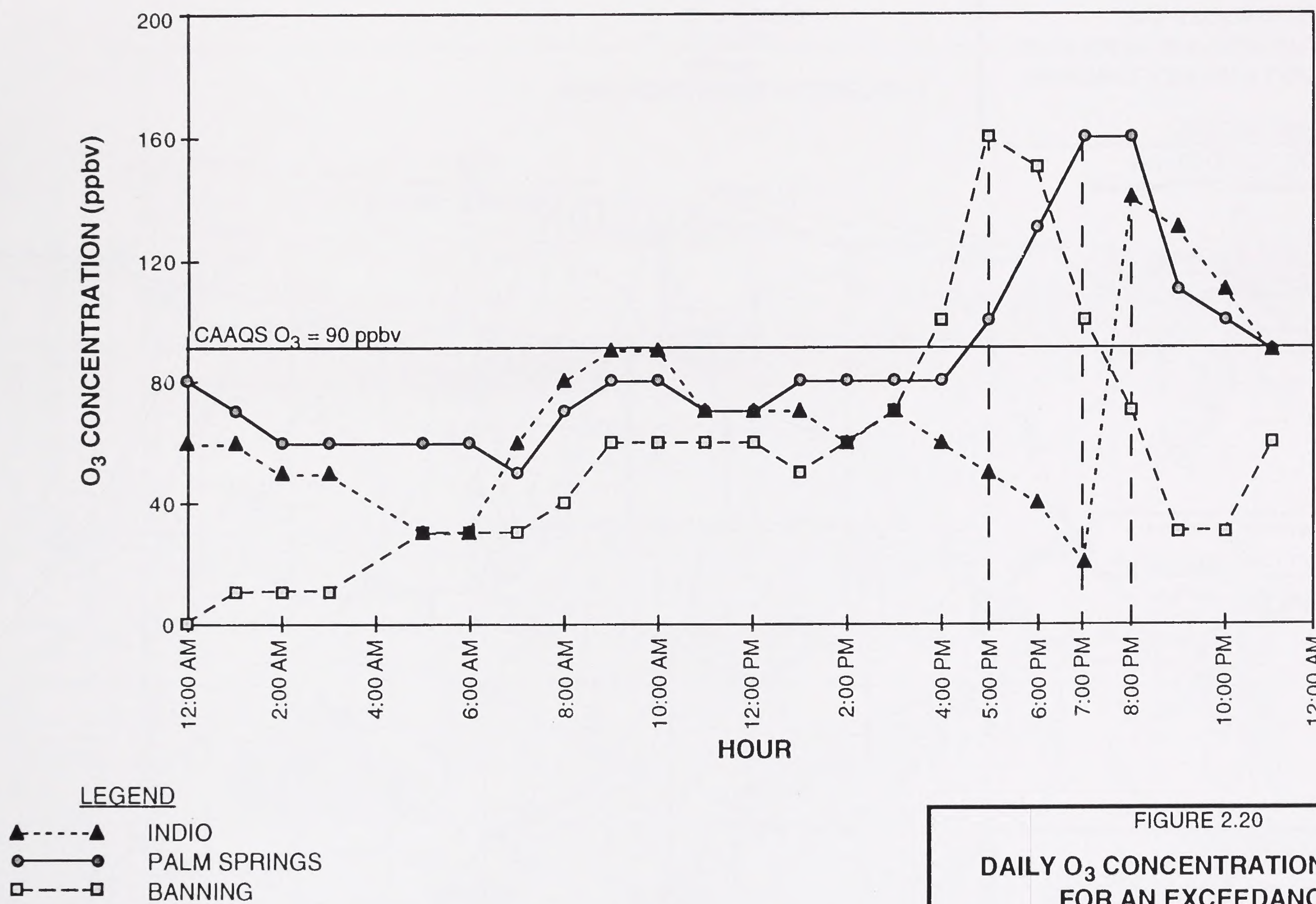


FIGURE 2.20

DAILY O_3 CONCENTRATION CYCLE FOR AN EXCEEDANCE AT INDIO, PALM SPRINGS AND BANNING ON AUGUST 15, 1992

MESQUITE REGIONAL LANDFILL

SOURCE: SCAQMD, 1992b

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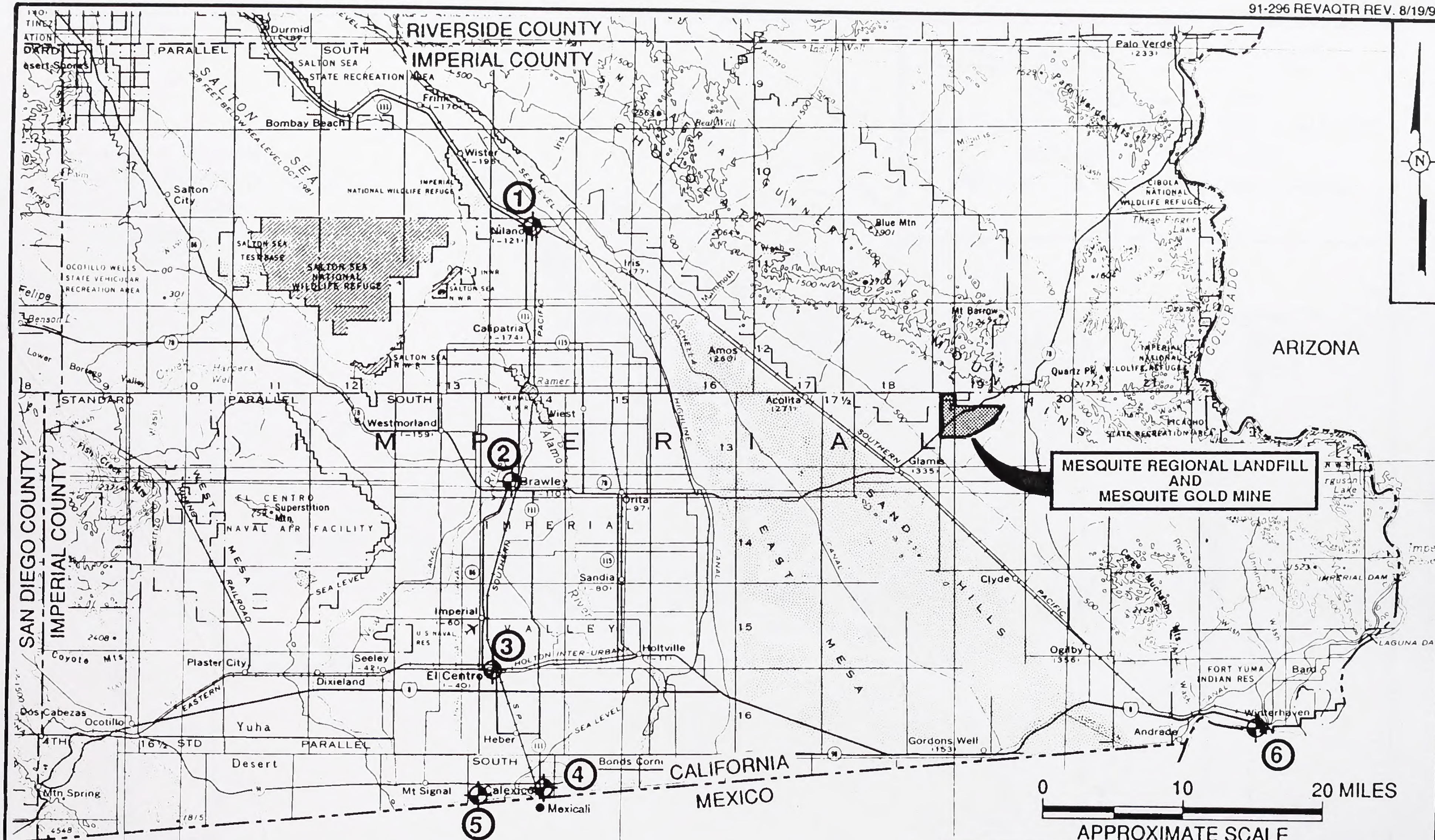
91-296 REVAQTR REV. 8/19/93



MONITORING STATION LOCATIONS

1. NILAND
2. BRAWLEY
3. EL CENTRO
4. CALEXICO
5. CALEXICO-GRANT
6. WINTERHAVEN

REFERENCE: USGS 1:500,000 SCALE MAP OF THE SOUTH HALF OF CALIFORNIA DATED 1981.

FIGURE 2.21

IMPERIAL COUNTY LOCATION MAP AND ICAPCD AMBIENT AIR QUALITY MONITORING SITES

MESQUITE REGIONAL LANDFILL

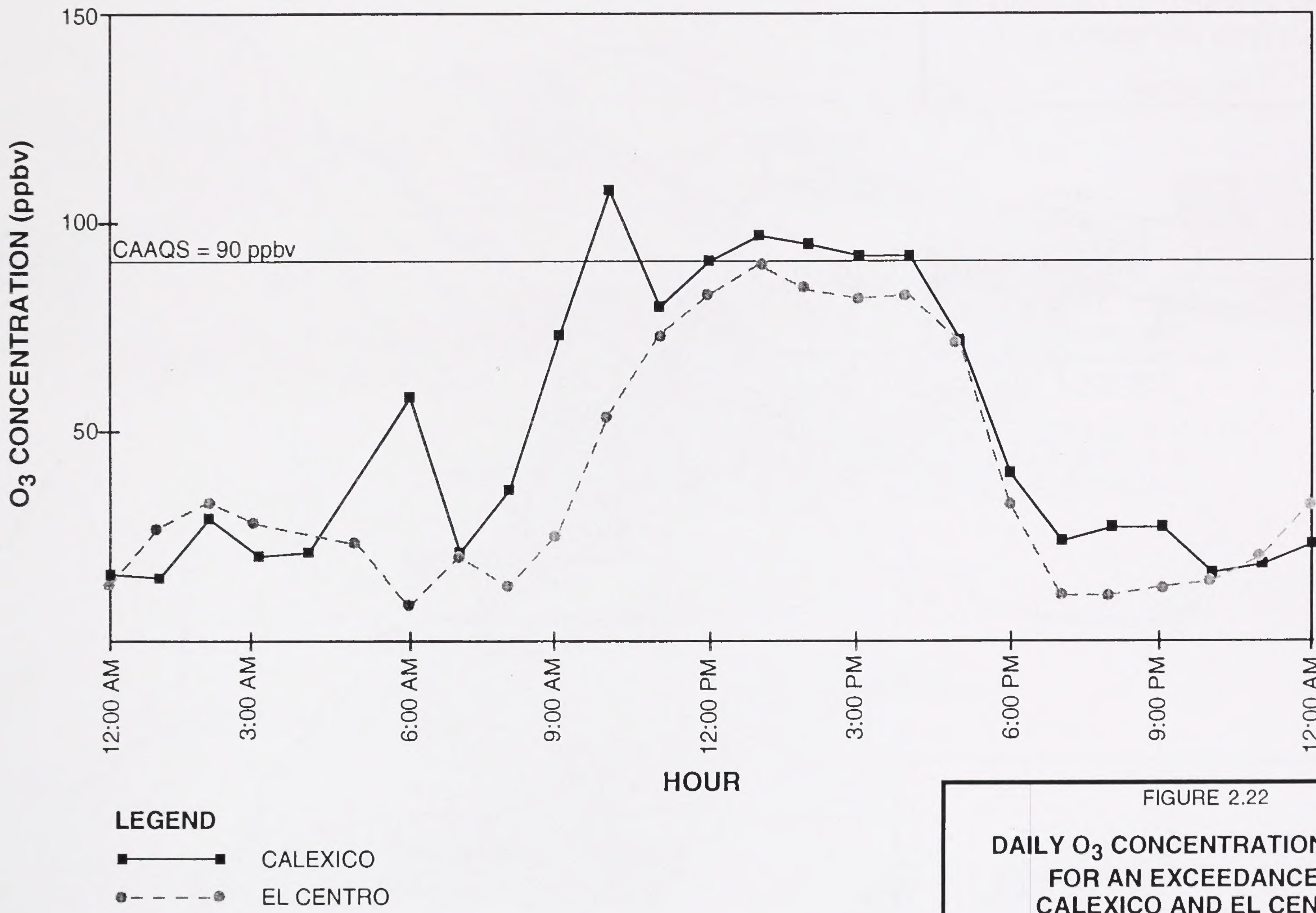


FIGURE 2.22

DAILY O_3 CONCENTRATION CYCLE FOR AN EXCEEDANCE AT CALEXICO AND EL CENTRO ON OCTOBER 9, 1992

MESQUITE REGIONAL LANDFILL

136391 91-296 REVAQTR REV. 8/19/93

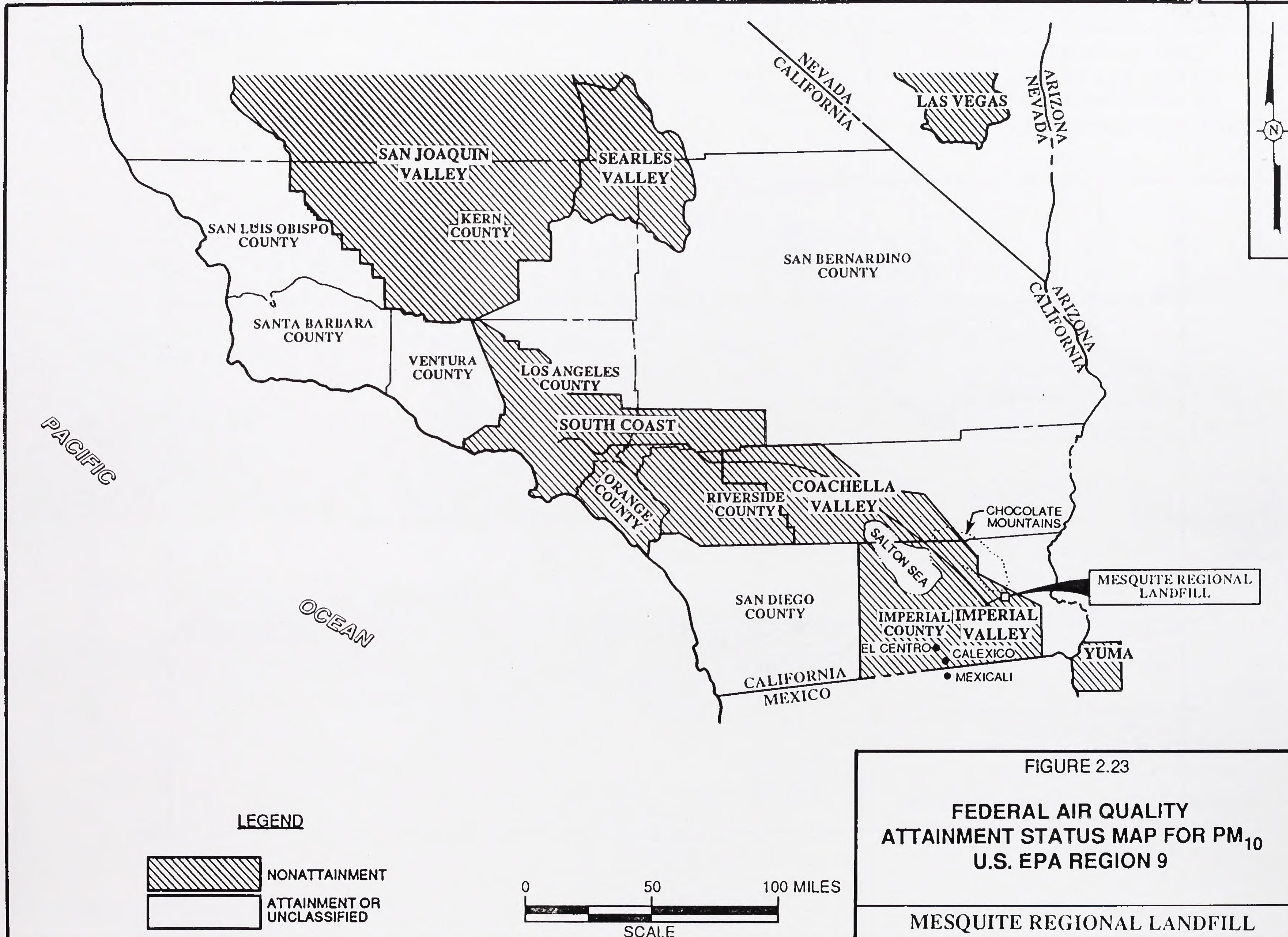


FIGURE 2.23

FEDERAL AIR QUALITY ATTAINMENT STATUS MAP FOR PM_{10} U.S. EPA REGION 9

MESQUITE REGIONAL LANDFILL

91-296REVAQTR -01 REV. 1/19/93

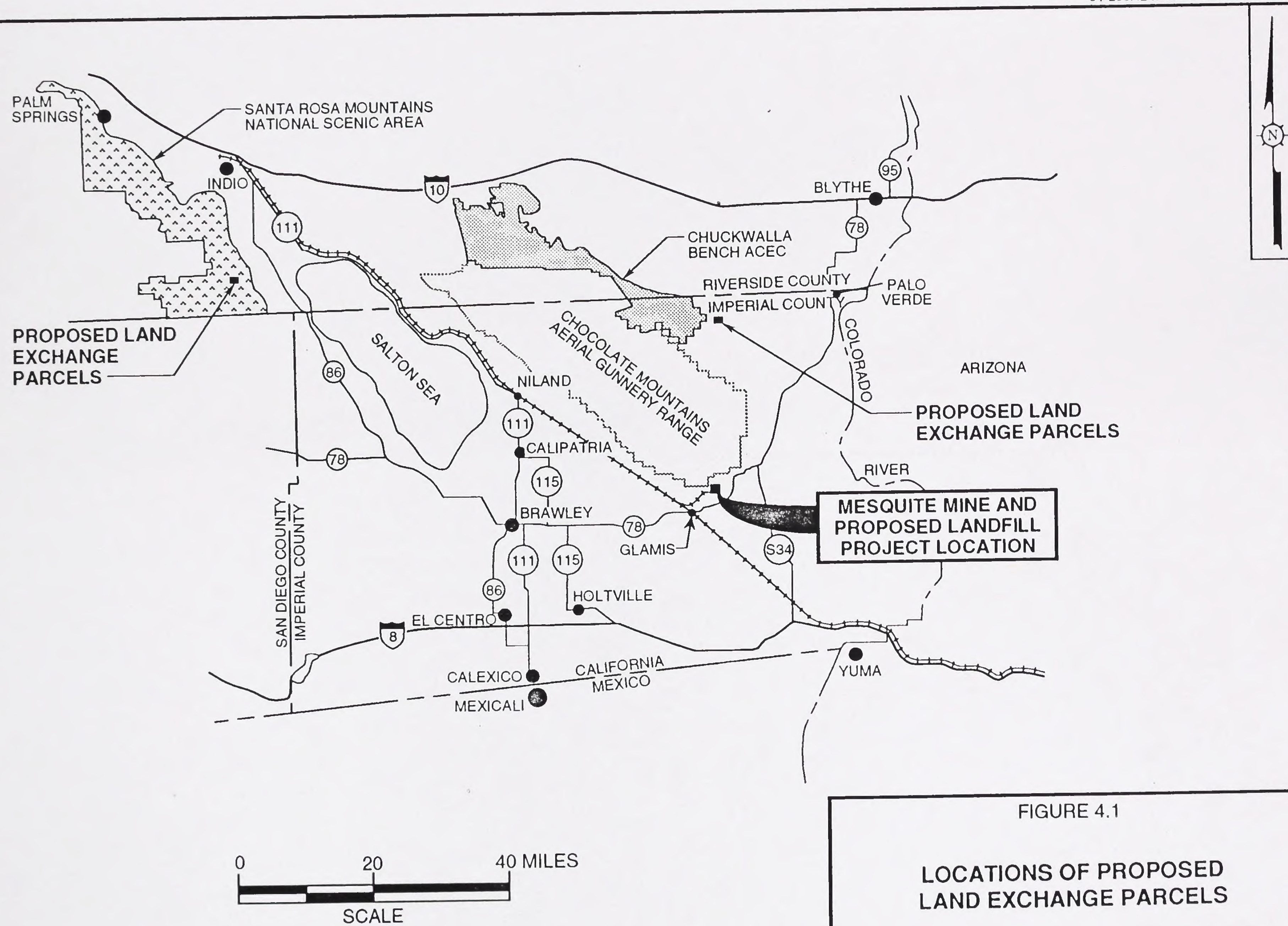


FIGURE 4.1

LOCATIONS OF PROPOSED LAND EXCHANGE PARCELS

MESQUITE REGIONAL LANDFILL

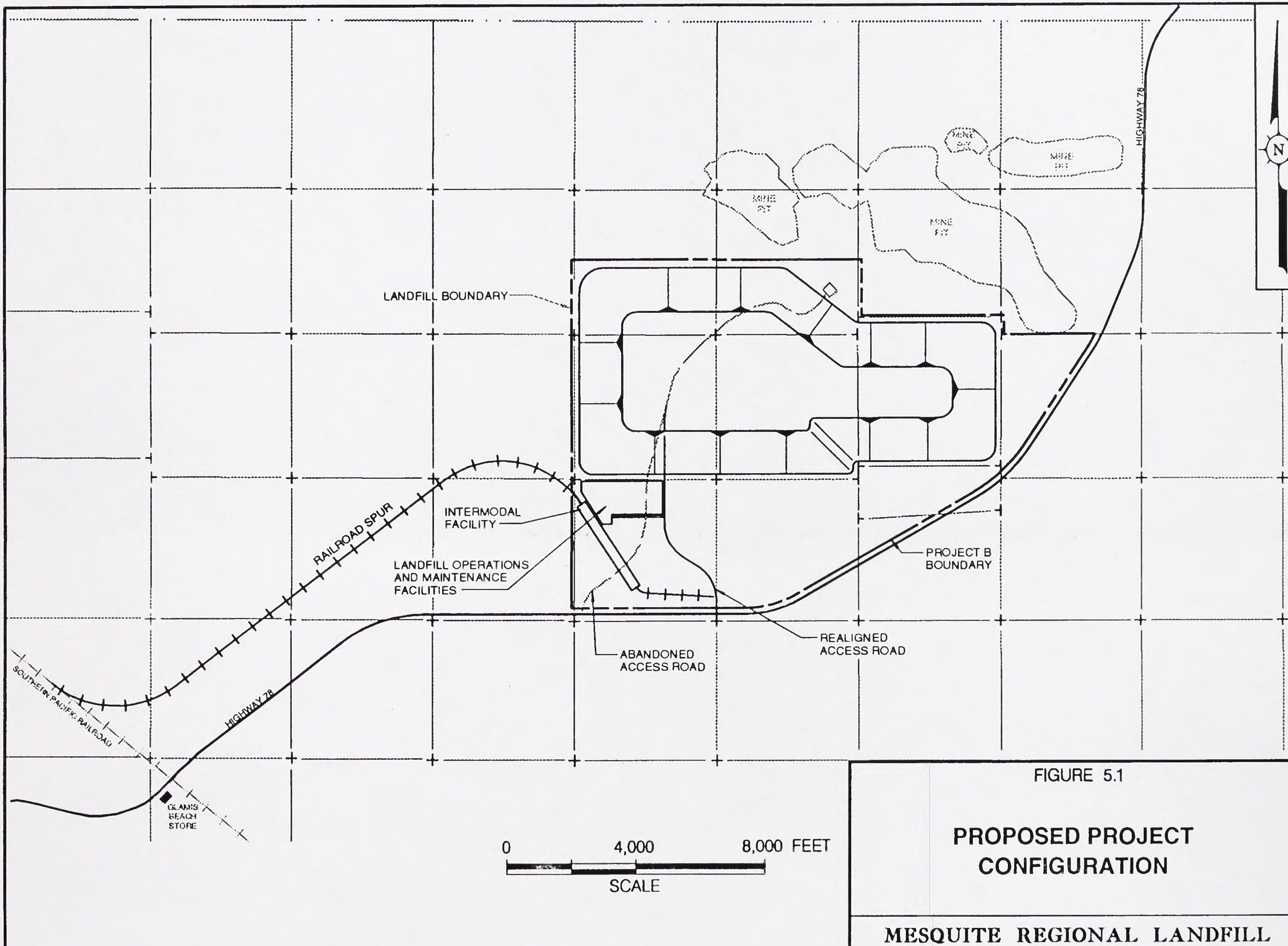


FIGURE 5.1

PROPOSED PROJECT CONFIGURATION

MESQUITE REGIONAL LANDFILL

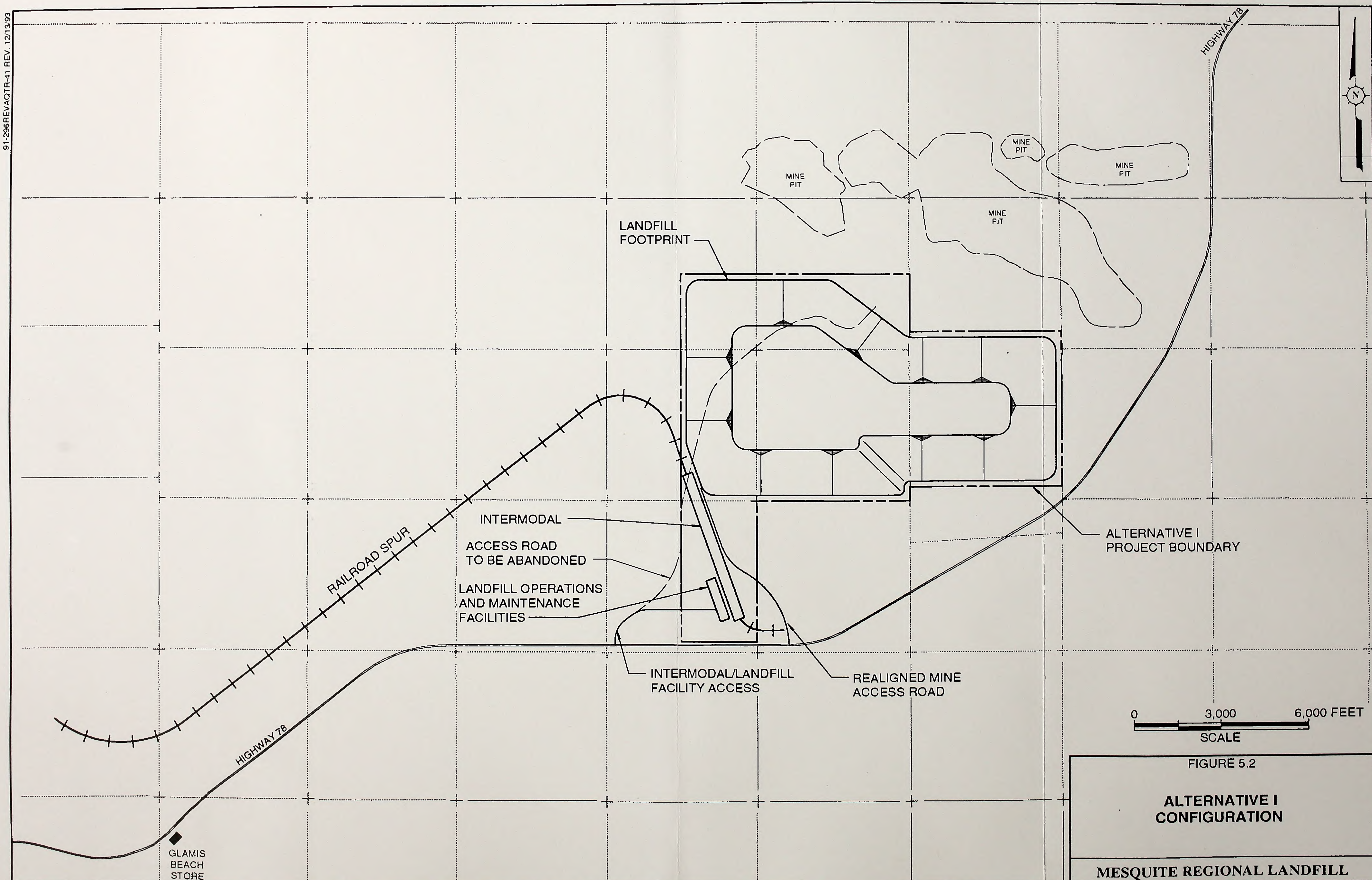


FIGURE 5.2

ALTERNATIVE I CONFIGURATION

MESQUITE REGIONAL LANDFILL

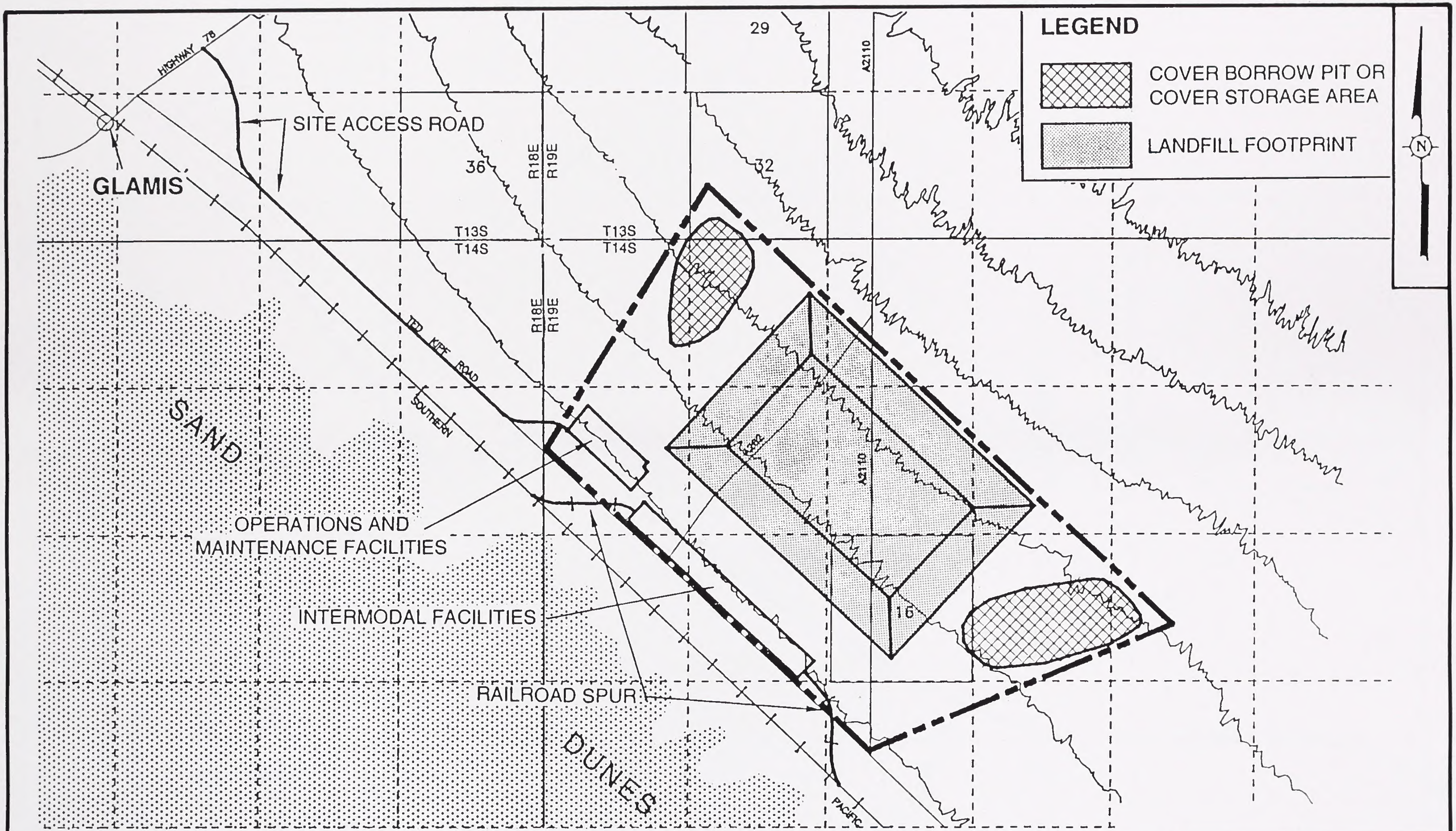


FIGURE 5.3

ALTERNATIVE III
ALTERNATIVE REGIONAL LANDFILL SITE

MESQUITE REGIONAL LANDFILL

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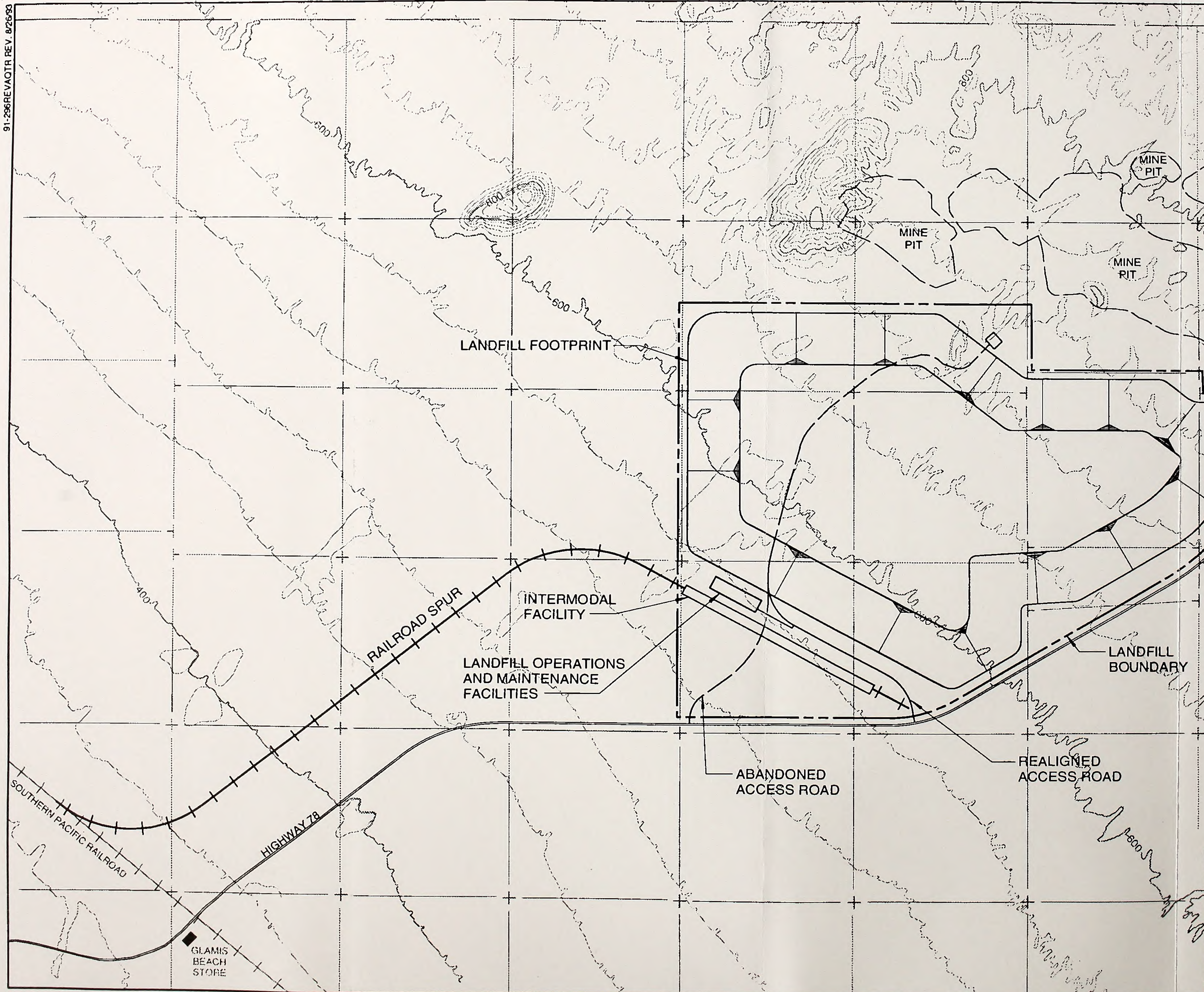
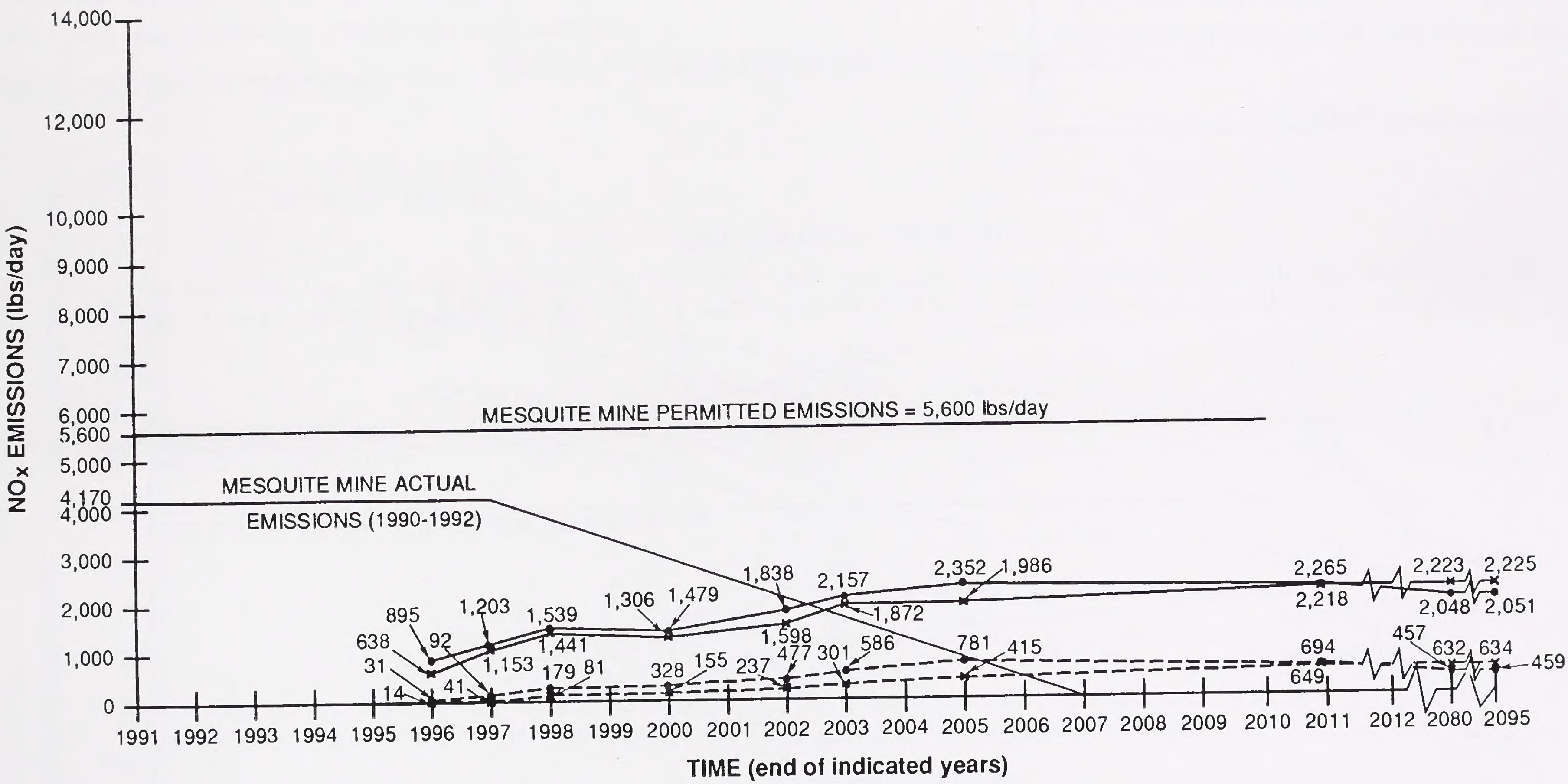


FIGURE 5.4

ALTERNATIVE IV
LARGER LANDFILL CONFIGURATION

MESQUITE REGIONAL LANDFILL



LEGEND FOR LANDFILL EMISSIONS

- All Emissions with "Conditioned" MSW Residue
- All Emissions with "As Received" MSW Residue
- Stationary Sources with "Conditioned" MSW Residue
- Stationary Sources with "As Received" MSW Residue

FIGURE 6.1

NO_X EMISSIONS FROM MESQUITE MINE AND MESQUITE REGIONAL LANDFILL

MESQUITE REGIONAL LANDFILL

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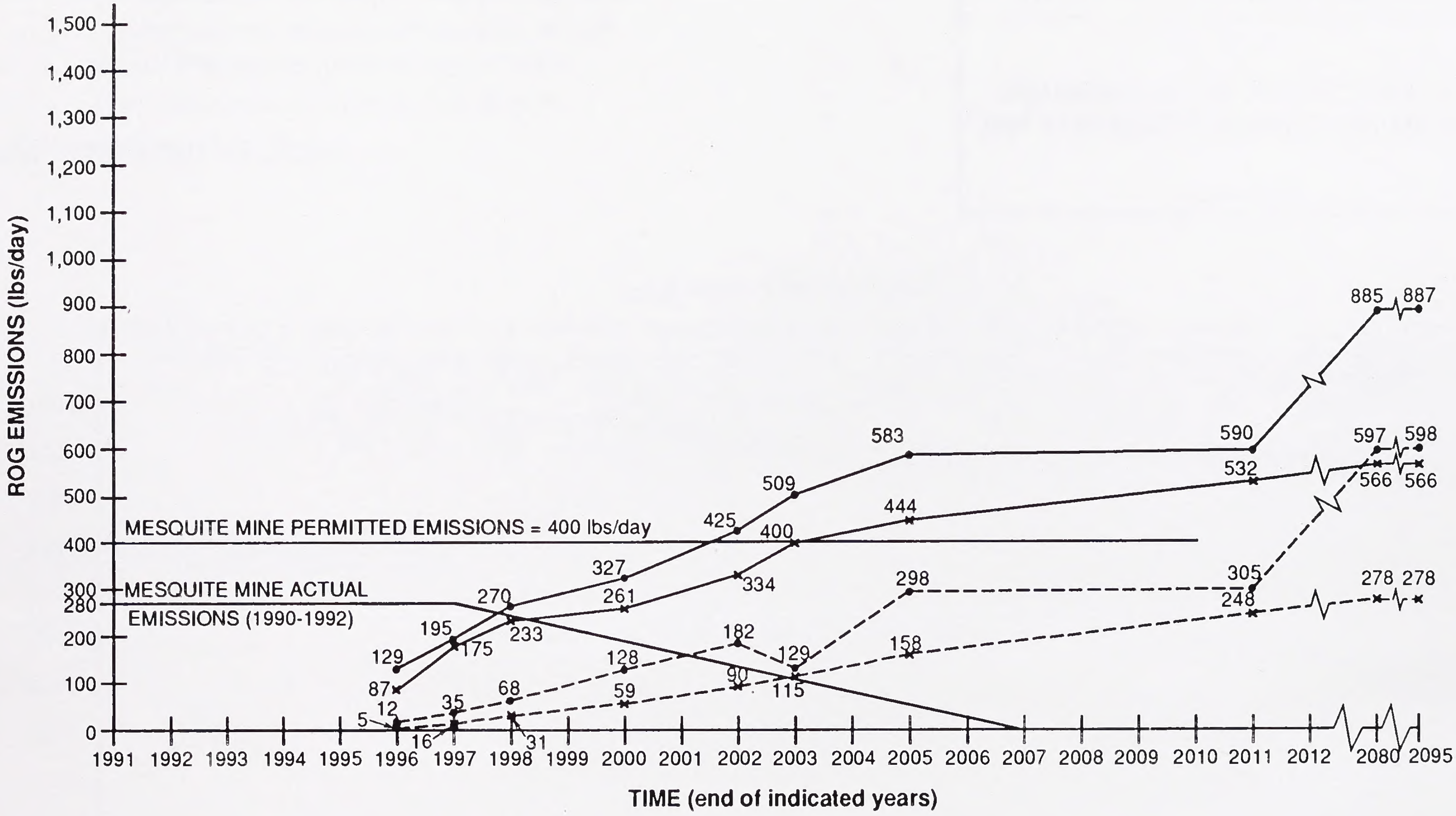


LEGEND FOR LANDFILL EMISSIONS

- All Emissions with "Conditioned" MSW Residue
- All Emissions with "As Received" MSW Residue
- Stationary Sources with "Conditioned" MSW Residue
- Stationary Sources with "As Received" MSW Residue

FIGURE 6.2

ROG EMISSIONS FROM MESQUITE MINE AND MESQUITE REGIONAL LANDFILL

MESQUITE REGIONAL LANDFILL

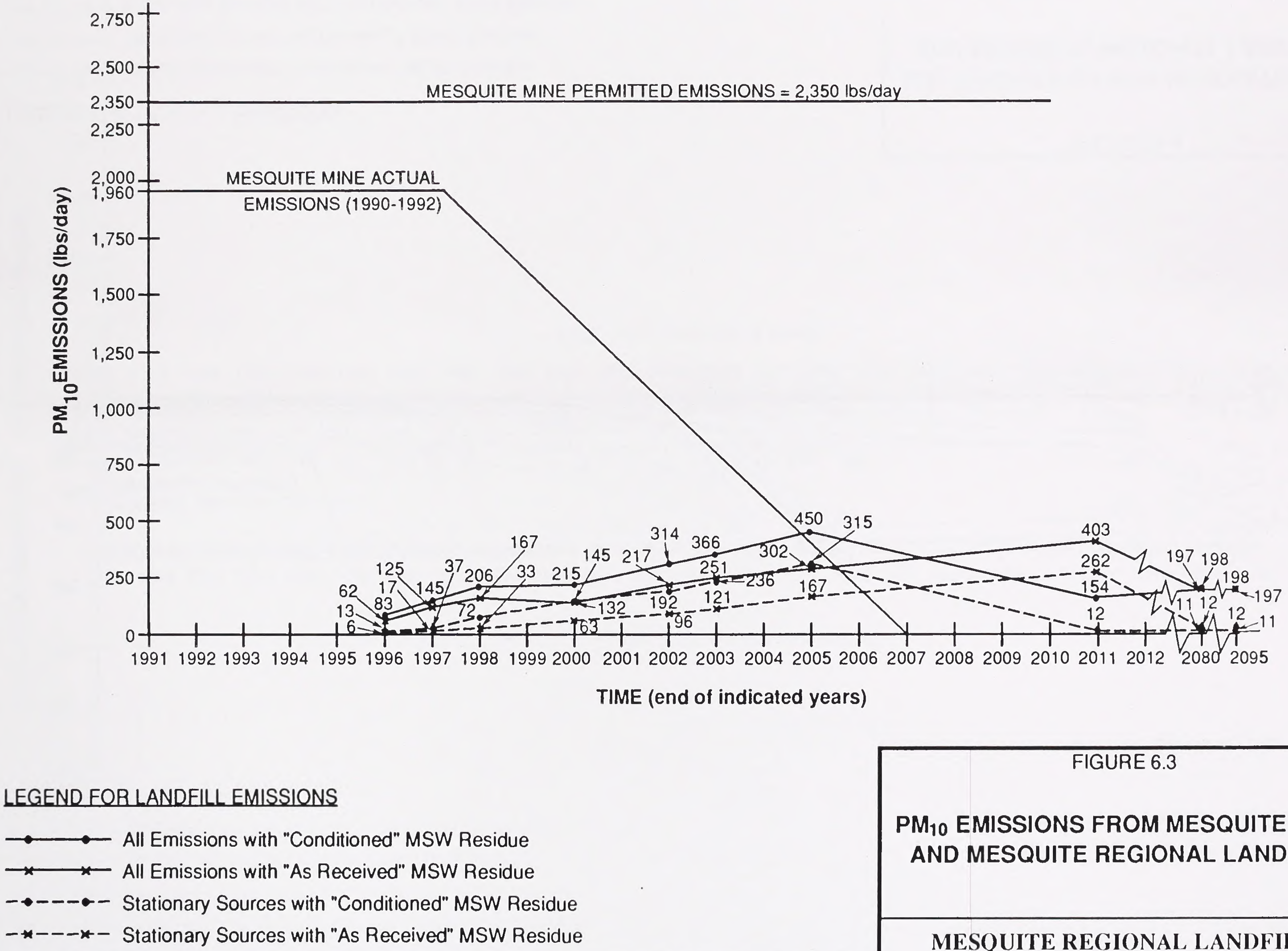
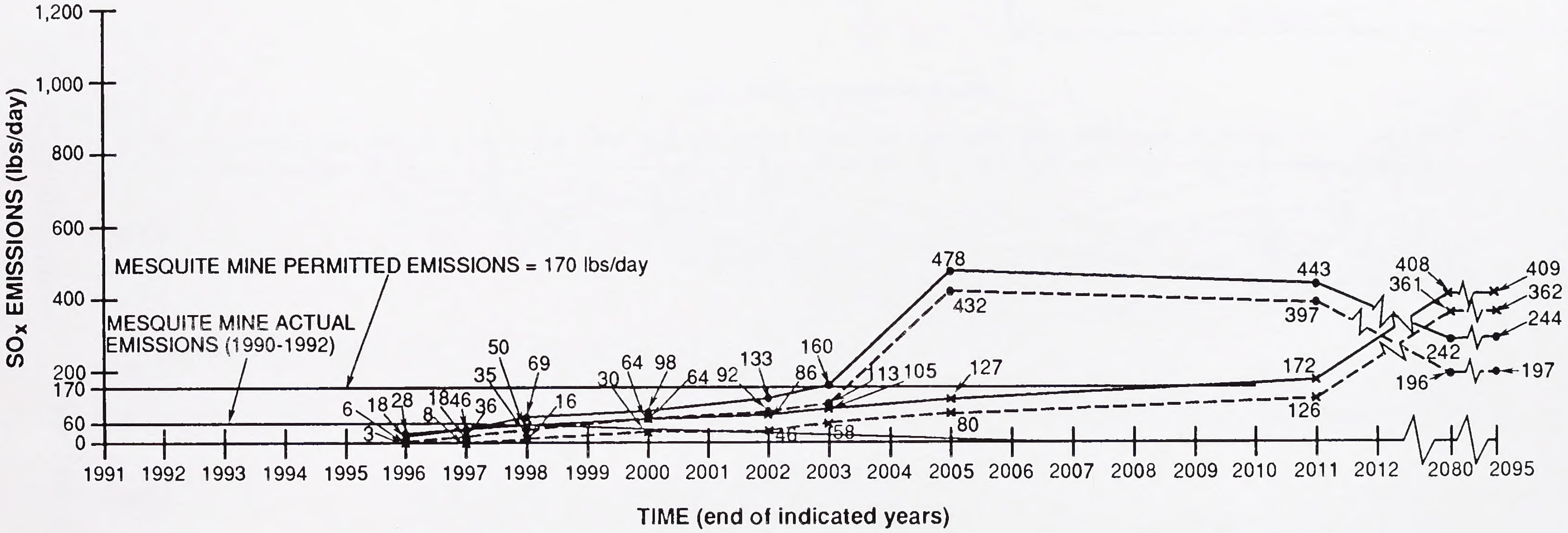


FIGURE 6.3

PM_{10} EMISSIONS FROM MESQUITE MINE AND MESQUITE REGIONAL LANDFILL

MESQUITE REGIONAL LANDFILL



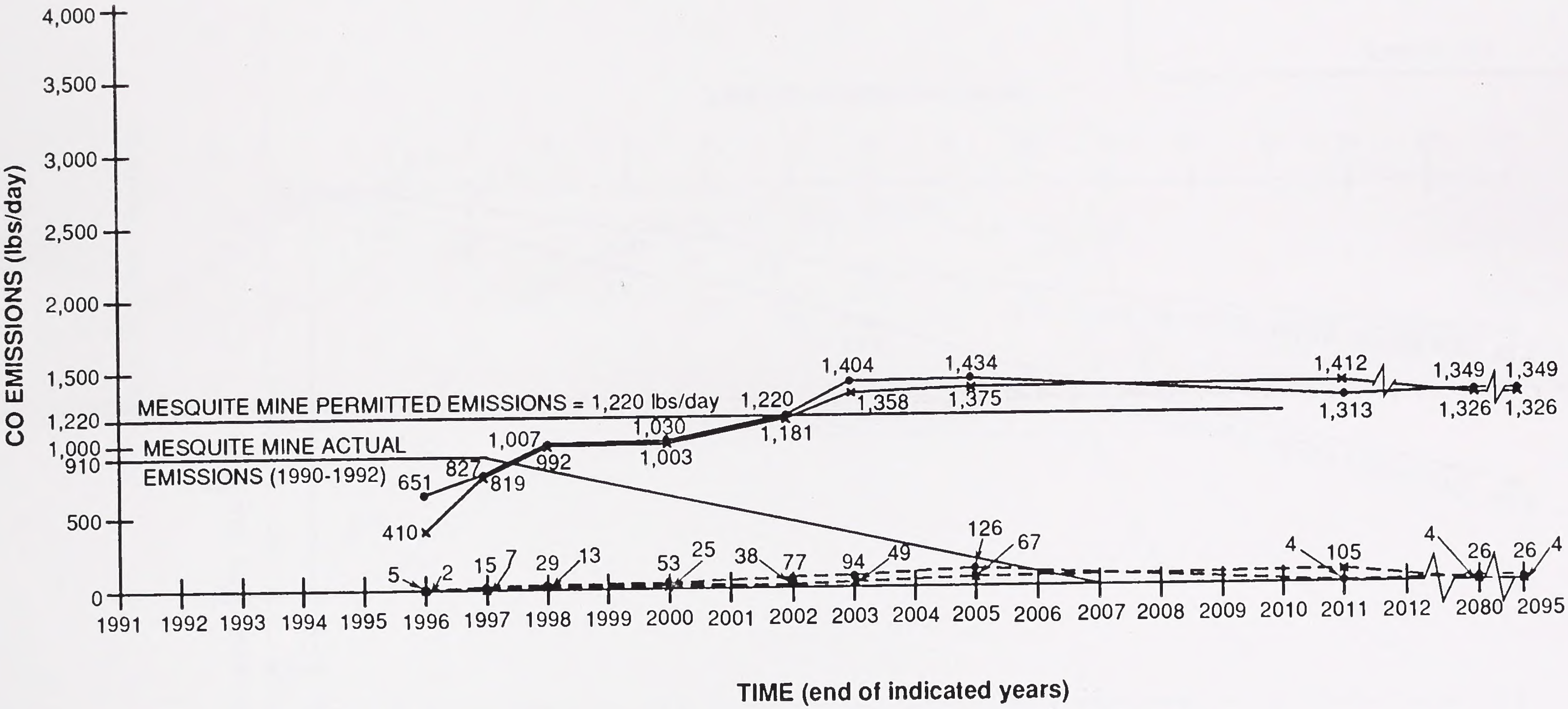
LEGEND FOR LANDFILL EMISSIONS

- All Emissions with "Conditioned" MSW Residue
- All Emissions with "As Received" MSW Residue
- Stationary Sources with "Conditioned" MSW Residue
- Stationary Sources with "As Received" MSW Residue

FIGURE 6.4

SO_X EMISSIONS FROM MESQUITE MINE AND MESQUITE REGIONAL LANDFILL

MESQUITE REGIONAL LANDFILL



LEGEND FOR LANDFILL EMISSIONS

- All Emissions with "Conditioned" MSW Residue
- All Emissions with "As Received" MSW Residue
- Stationary Sources with "Conditioned" MSW Residue
- Stationary Sources with "As Received" MSW Residue

FIGURE 6.5

CO EMISSIONS FROM MESQUITE MINE AND MESQUITE REGIONAL LANDFILL

MESQUITE REGIONAL LANDFILL

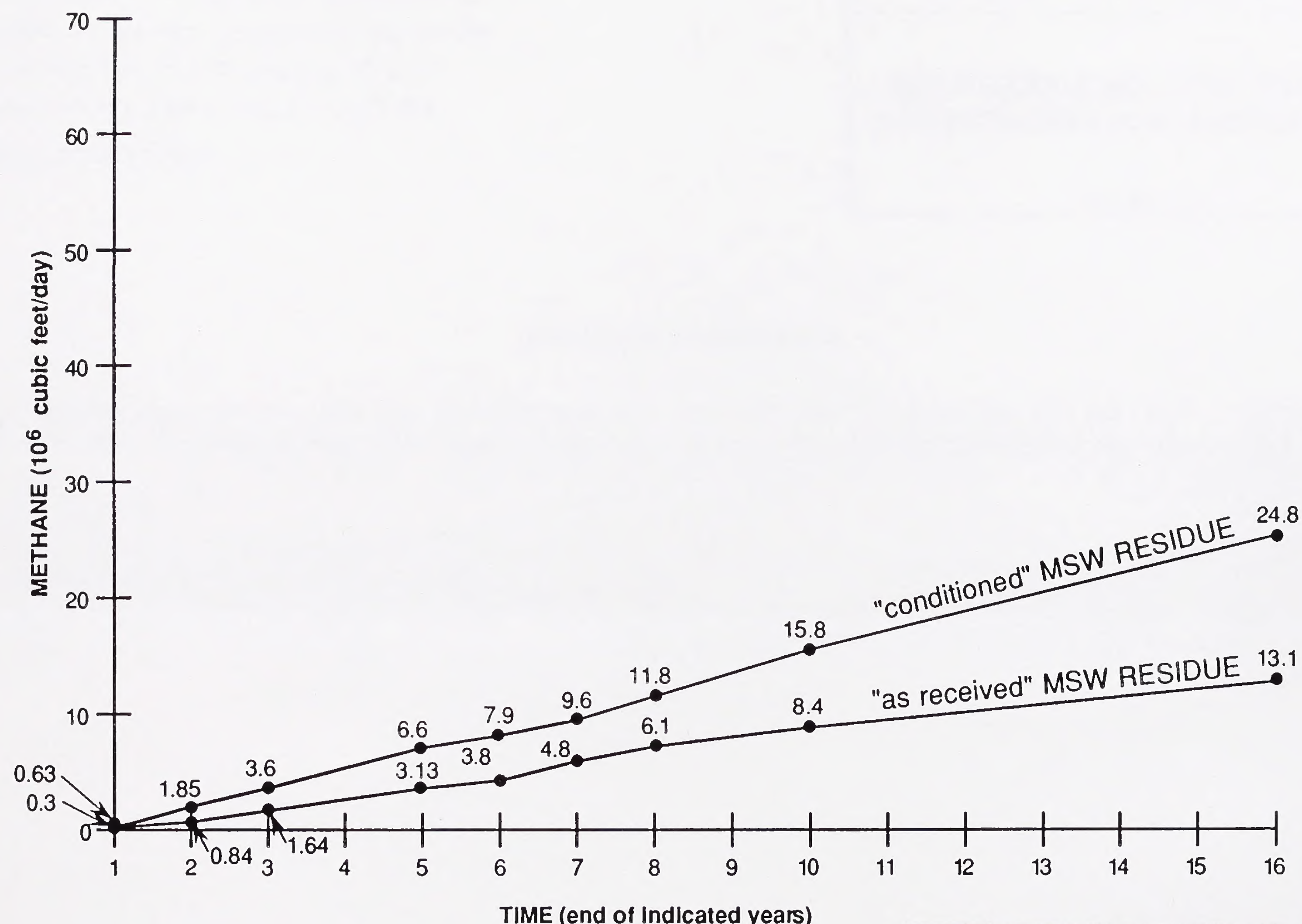


FIGURE 6.6

SHORT-TERM METHANE GAS GENERATION RATE

MESQUITE REGIONAL LANDFILL

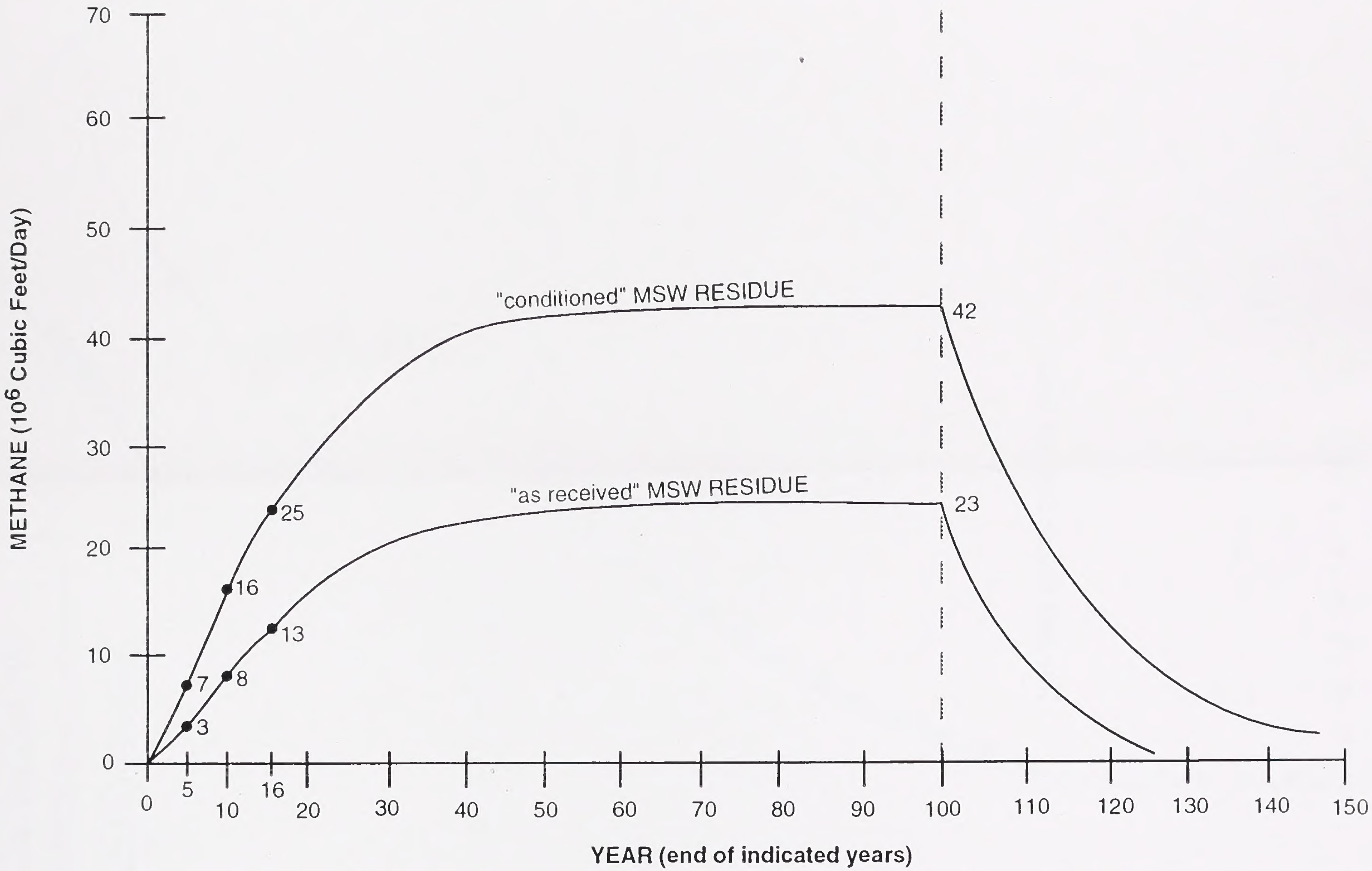


FIGURE 6.7

LONG-TERM METHANE GAS GENERATION RATE

MESQUITE REGIONAL LANDFILL

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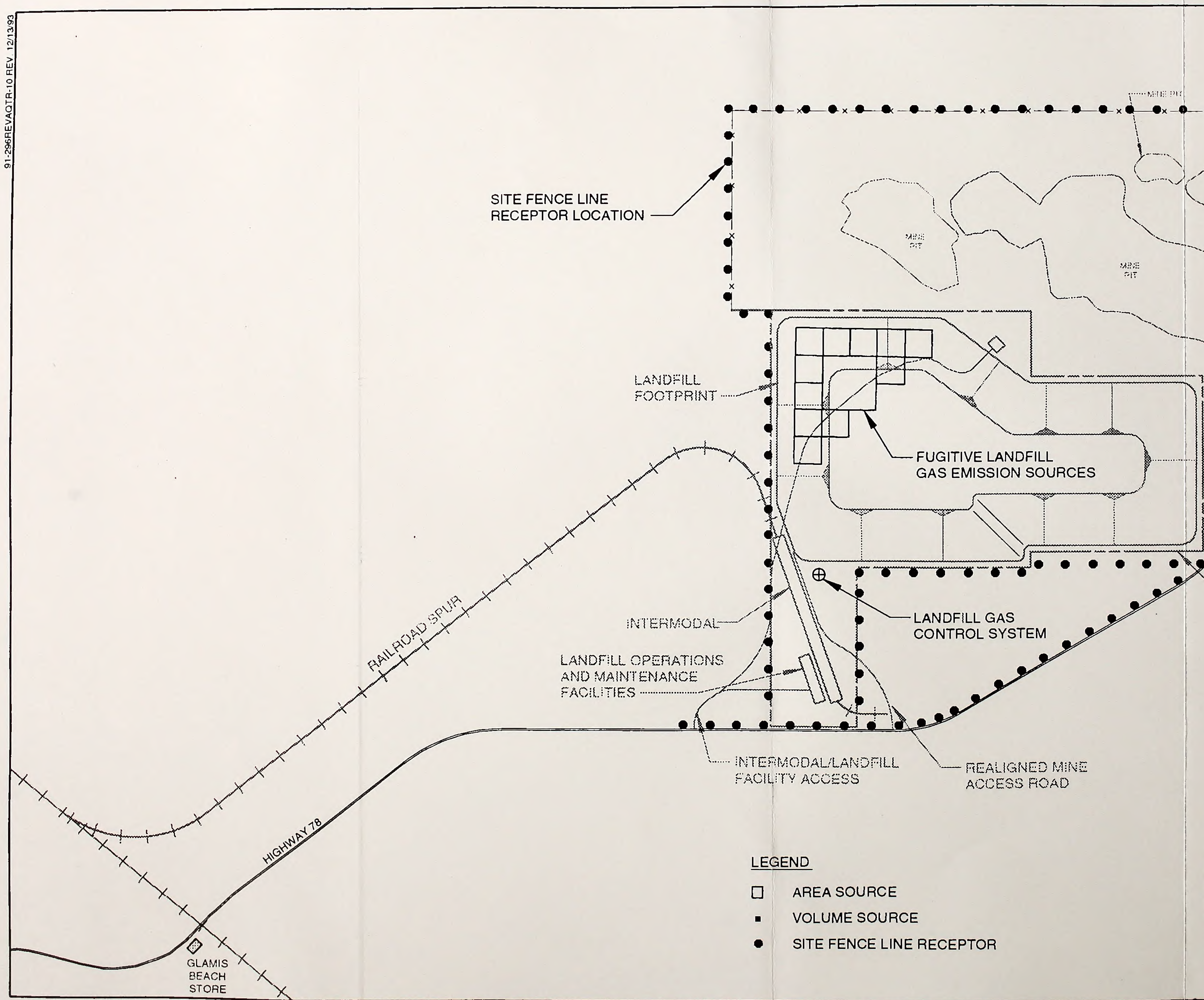

FIGURE 6.8

ALTERNATIVE I - YEAR 16 POINT AND FUGITIVE LANDFILL GAS EMISSION SOURCE AND BOUNDARY RECEPTOR LOCATIONS

MESQUITE REGIONAL LANDFILL

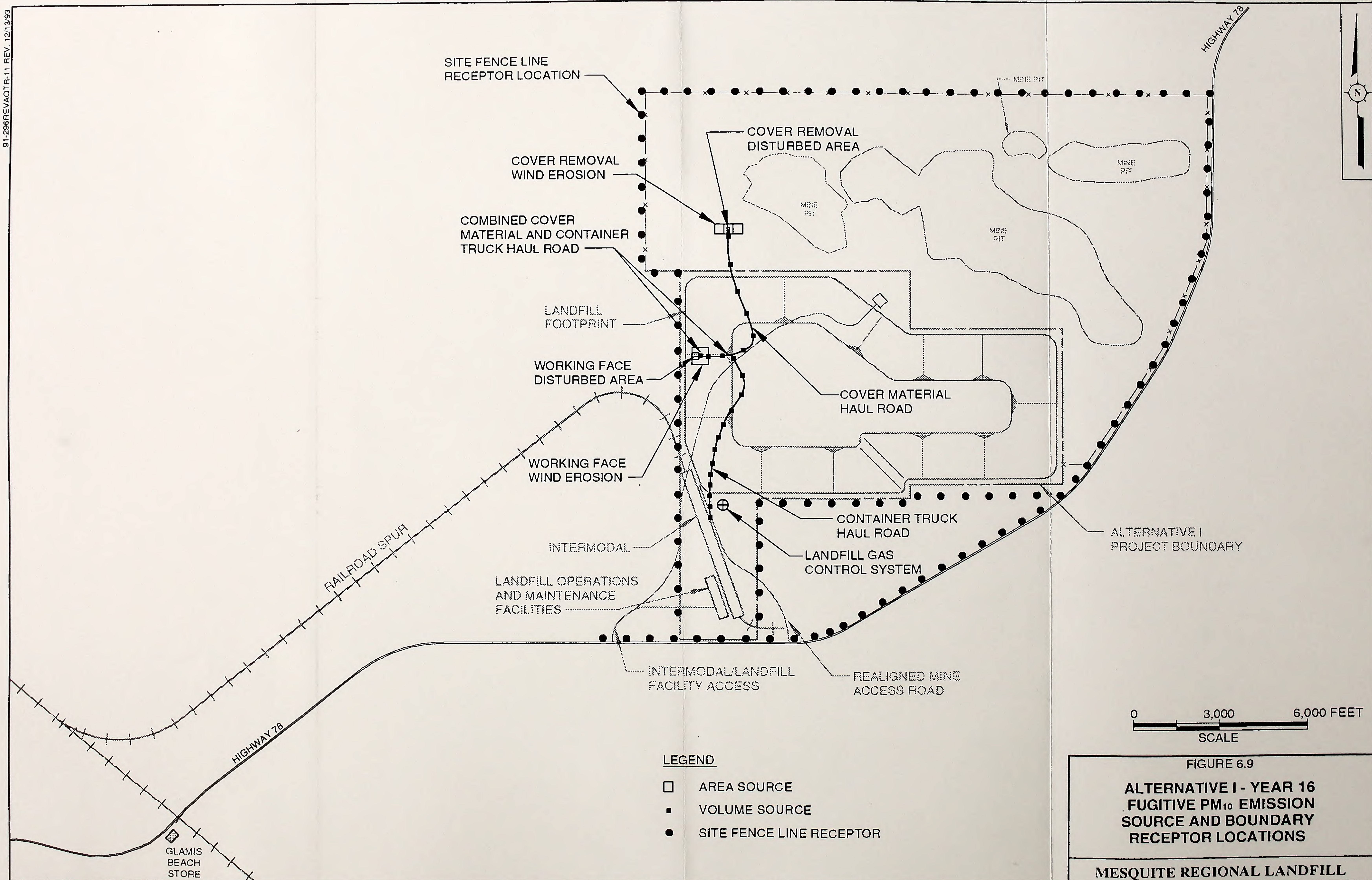

FIGURE 6.9

ALTERNATIVE I - YEAR 16 FUGITIVE PM_{10} EMISSION SOURCE AND BOUNDARY RECEPTOR LOCATIONS

MESQUITE REGIONAL LANDFILL

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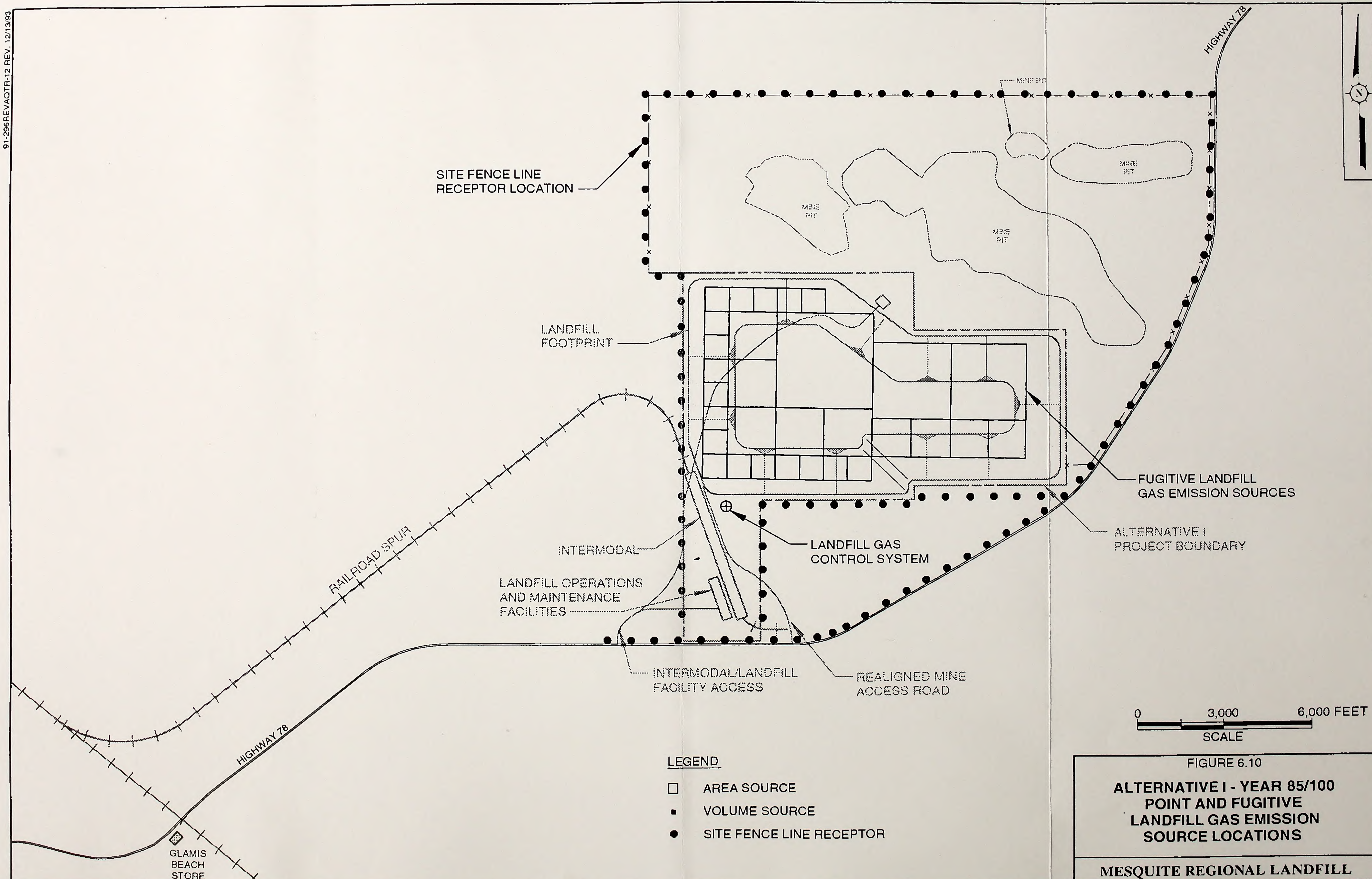


FIGURE 6.10

ALTERNATIVE I - YEAR 85/100 POINT AND FUGITIVE LANDFILL GAS EMISSION SOURCE LOCATIONS

MESQUITE REGIONAL LANDFILL

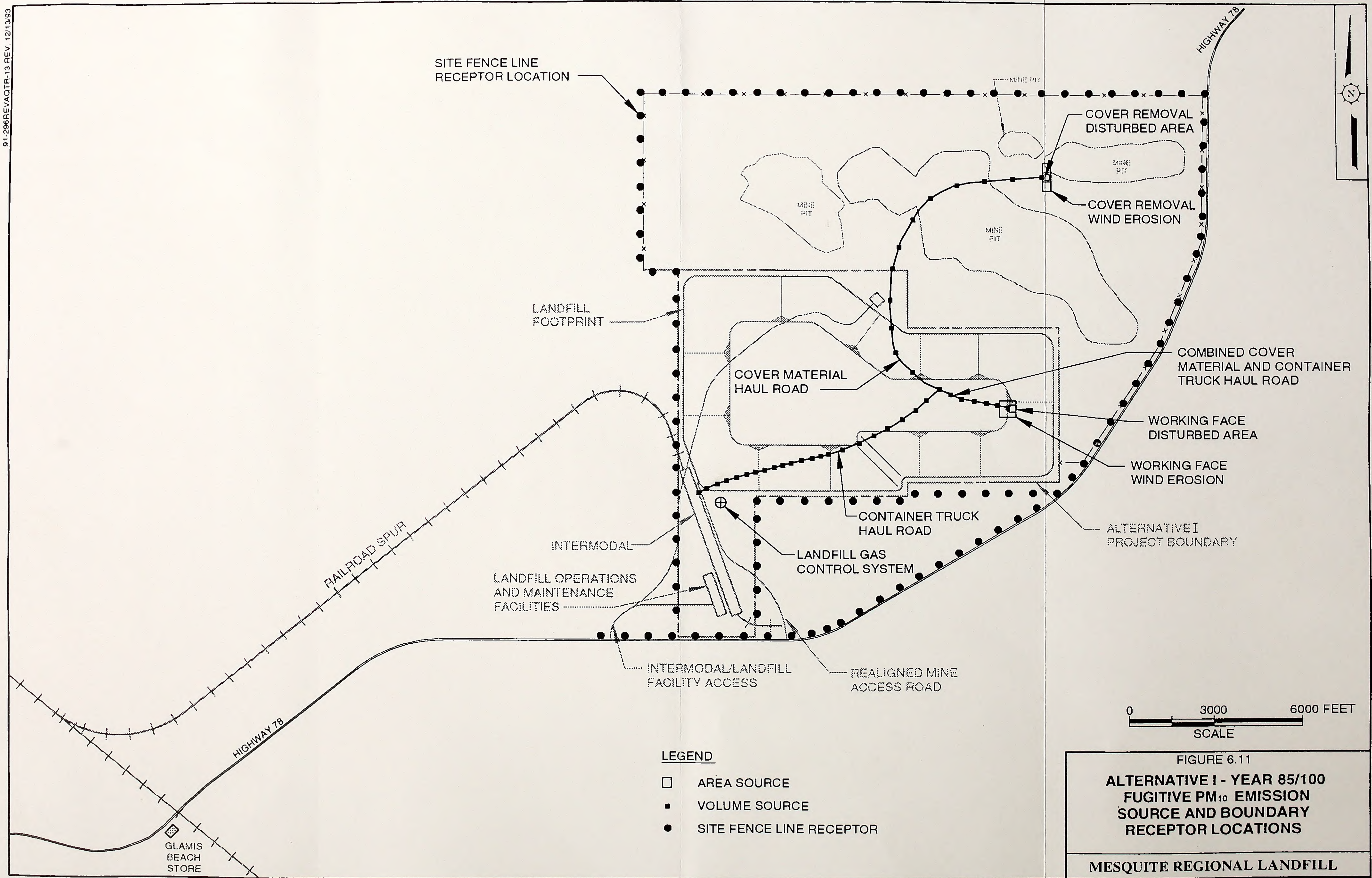


FIGURE 6.11

ALTERNATIVE I - YEAR 85/100 FUGITIVE PM_{10} EMISSION SOURCE AND BOUNDARY RECEPTOR LOCATIONS

MESQUITE REGIONAL LANDFILL

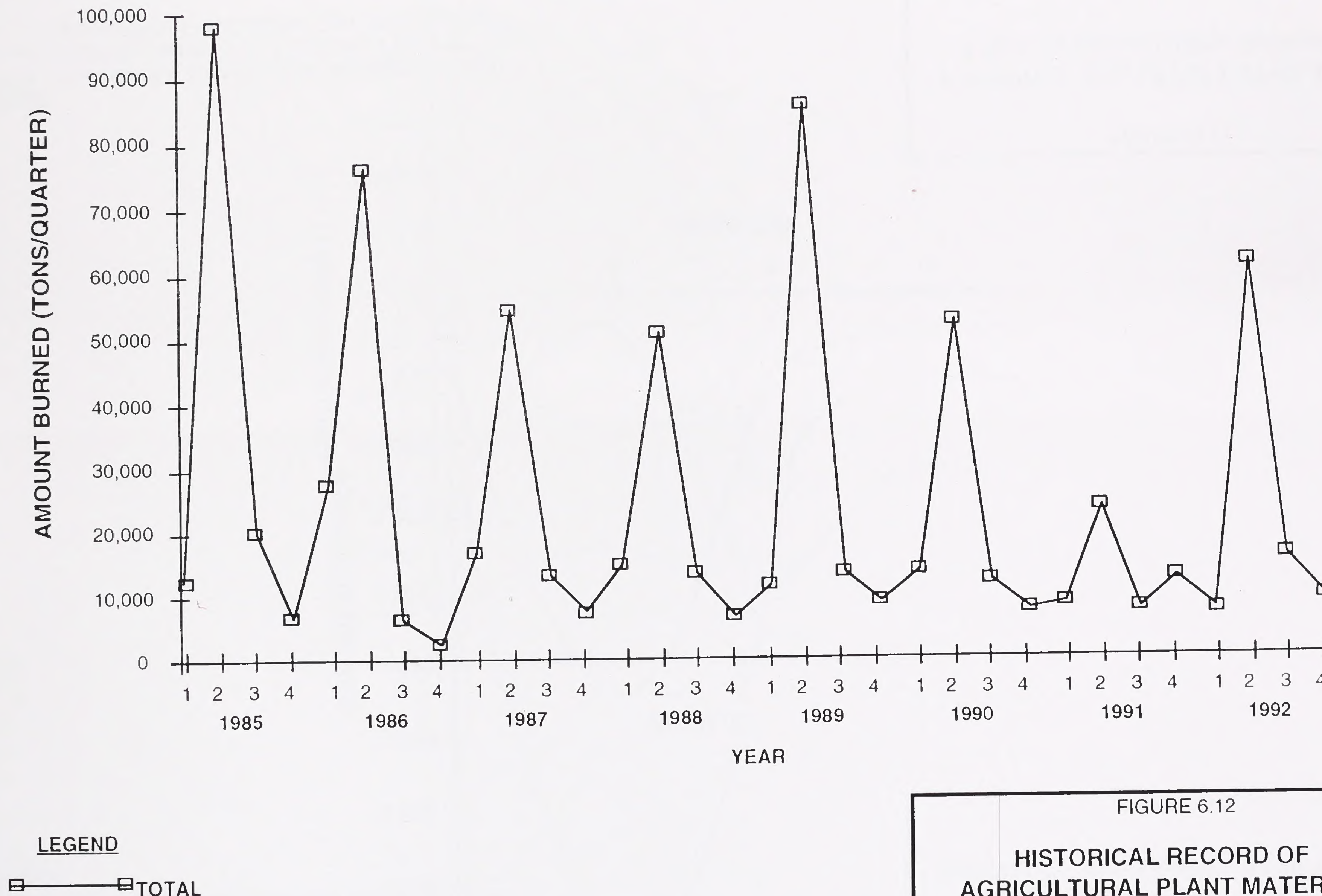
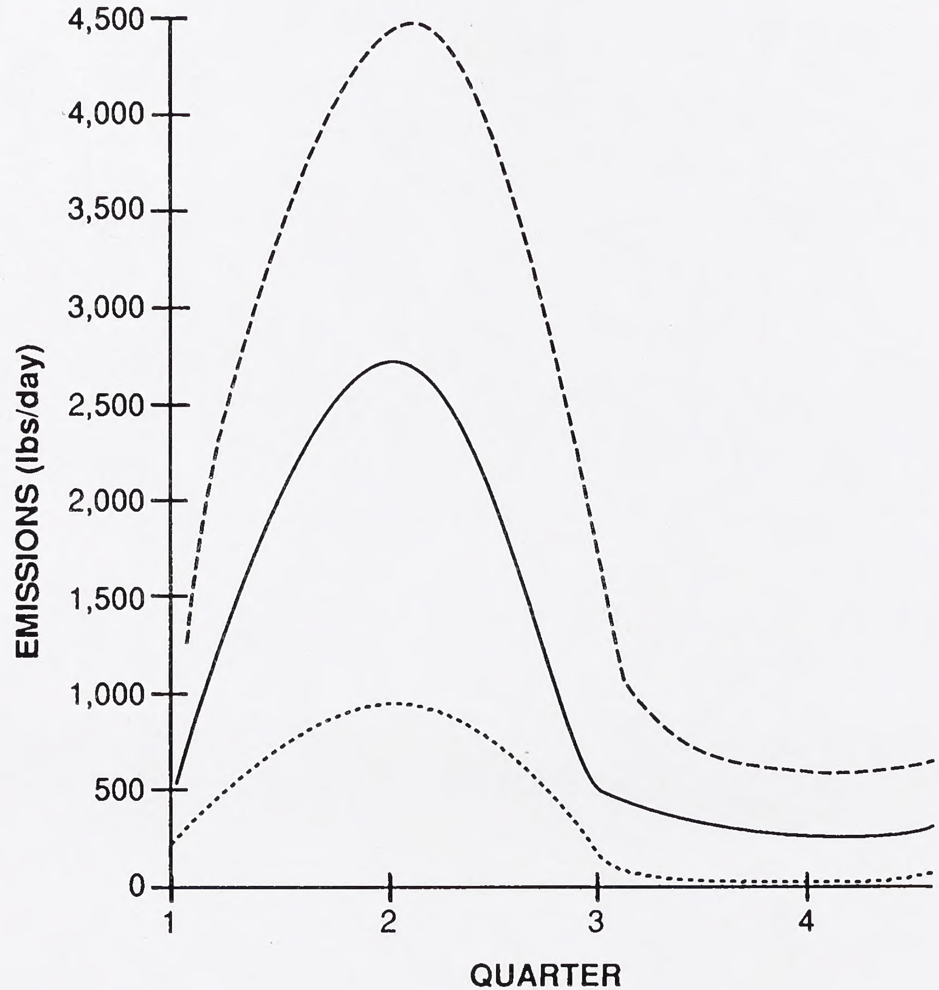


FIGURE 6.12

HISTORICAL RECORD OF AGRICULTURAL PLANT MATERIAL BURN RATES IN IMPERIAL COUNTY

MESQUITE REGIONAL LANDFILL



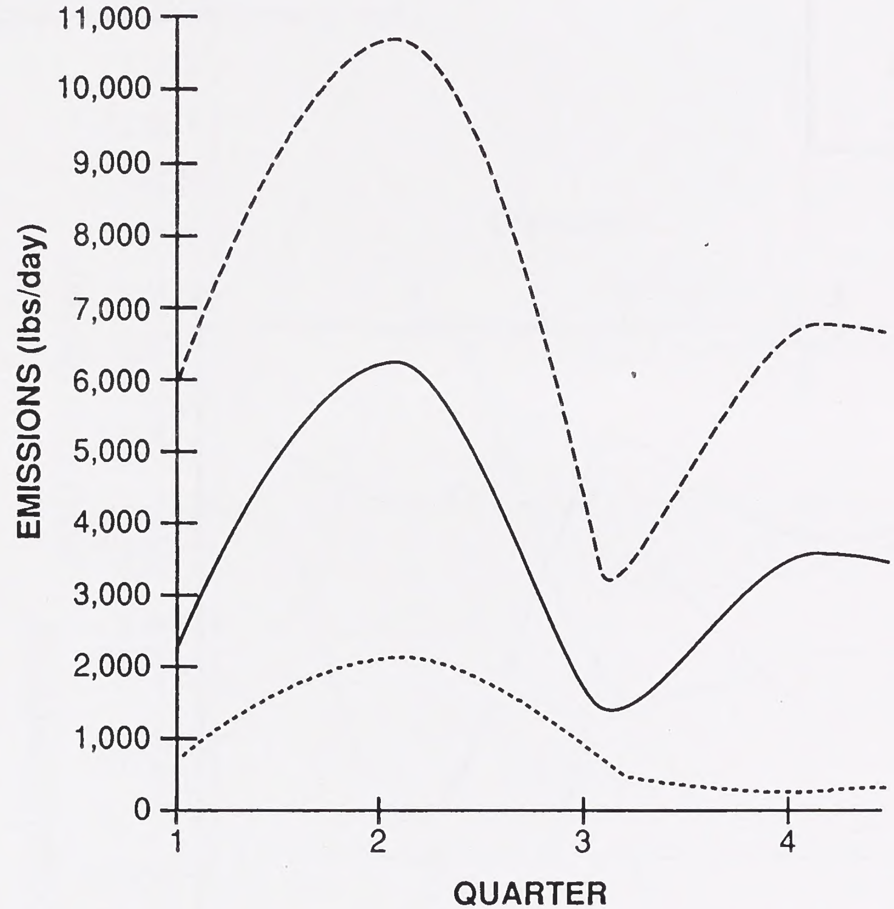
LEGEND
- - - Maximum NO_x Emissions from Agricultural Burning (1)
—— Mean NO_x Emissions from Agricultural Burning (1)
······ Minimum NO_x Emissions from Agricultural Burning (1)

(1) Emissions estimated from records of agricultural burning in Imperial County during period 1985-1992.

FIGURE 6.13

POTENTIAL NO_x OFFSET AVAILABLE FROM AGRICULTURAL BURNING

MESQUITE REGIONAL LANDFILL



LEGEND

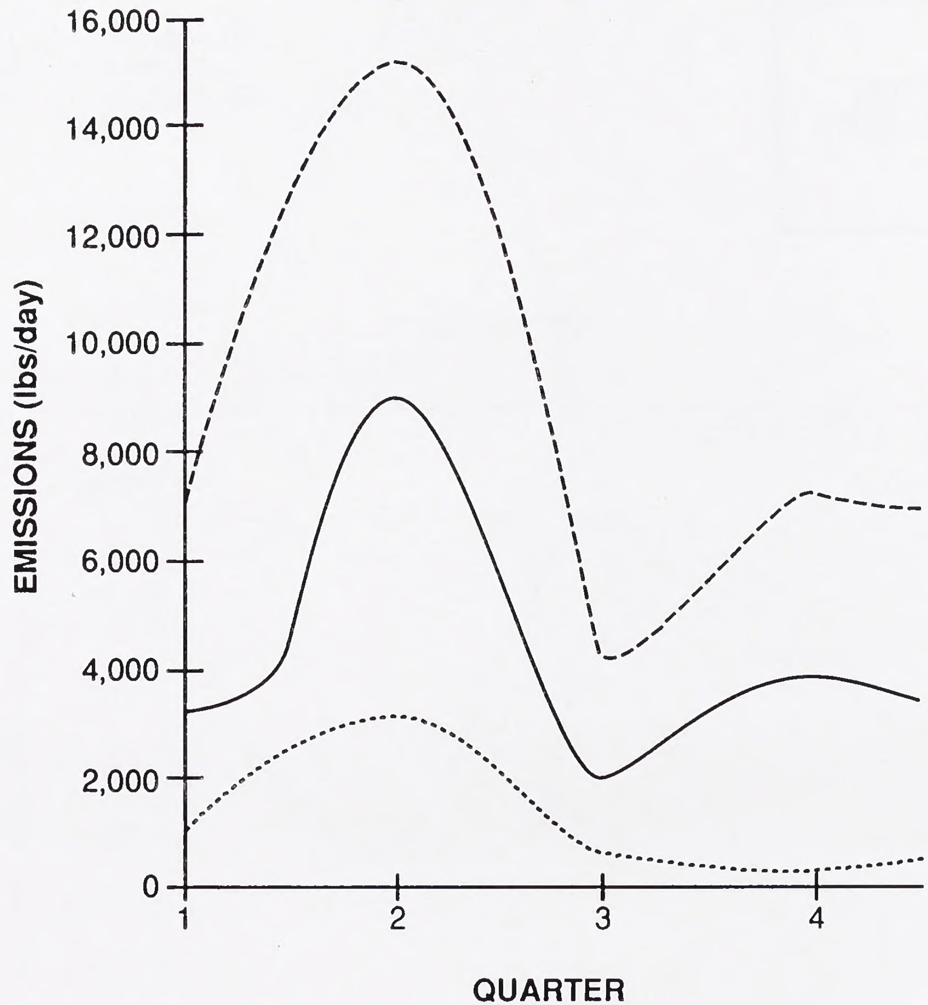
- – – – Maximum ROG Emissions from Agricultural Burning (1)
- ——— Mean ROG Emissions from Agricultural Burning (1)
- ········ Minimum ROG Emissions from Agricultural Burning (1)

(1) Emissions estimated from records of agricultural burning in Imperial County during period 1985-1992.

FIGURE 6.14

POTENTIAL ROG OFFSET AVAILABLE FROM AGRICULTURAL BURNING

MESQUITE REGIONAL LANDFILL



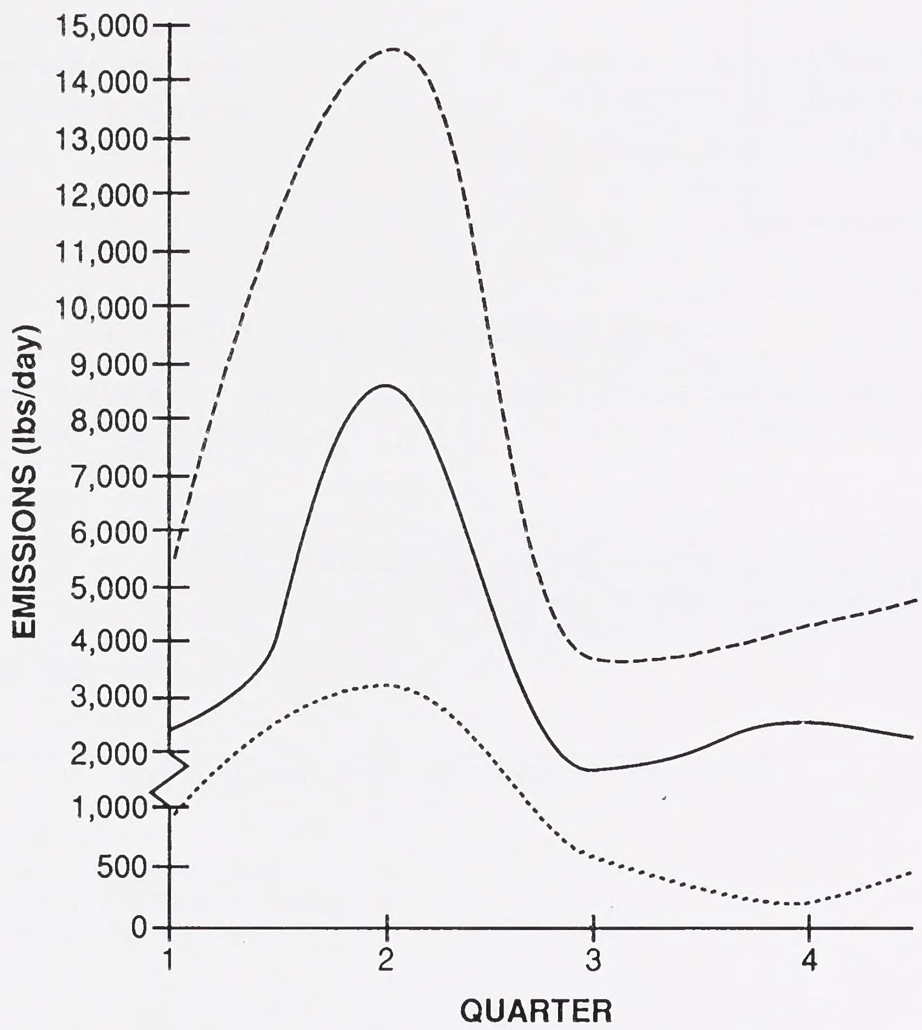
LEGEND
- - - Maximum Ozone Precursor Emissions from Agricultural Burning (1)
—— Mean Ozone Precursor Emissions from Agricultural Burning (1)
········ Minimum Ozone Precursor Emissions from Agricultural Burning (1)

(1) Emissions estimated from records of agricultural burning in Imperial County during period 1985-1992.

FIGURE 6.15

POTENTIAL OZONE PRECURSOR OFFSET AVAILABLE FROM AGRICULTURAL BURNING

MESQUITE REGIONAL LANDFILL



GEND

- – – Maximum PM_{10} Emissions from Agricultural Burning (1)(2)
- —— Mean PM_{10} Emissions from Agricultural Burning (1)(2)
- ······ Minimum PM_{10} Emissions from Agricultural Burning (1)(2)

Emissions estimated from records of agricultural burning in
mperial County during period 1985-1992.
SO_X emissions from agricultural burning are negligible.

FIGURE 6.16

POTENTIAL PM_{10} + PM_{10} PRECURSOR OFFSET AVAILABLE FROM AGRICULTURAL BURNING

MESQUITE REGIONAL LANDFILL

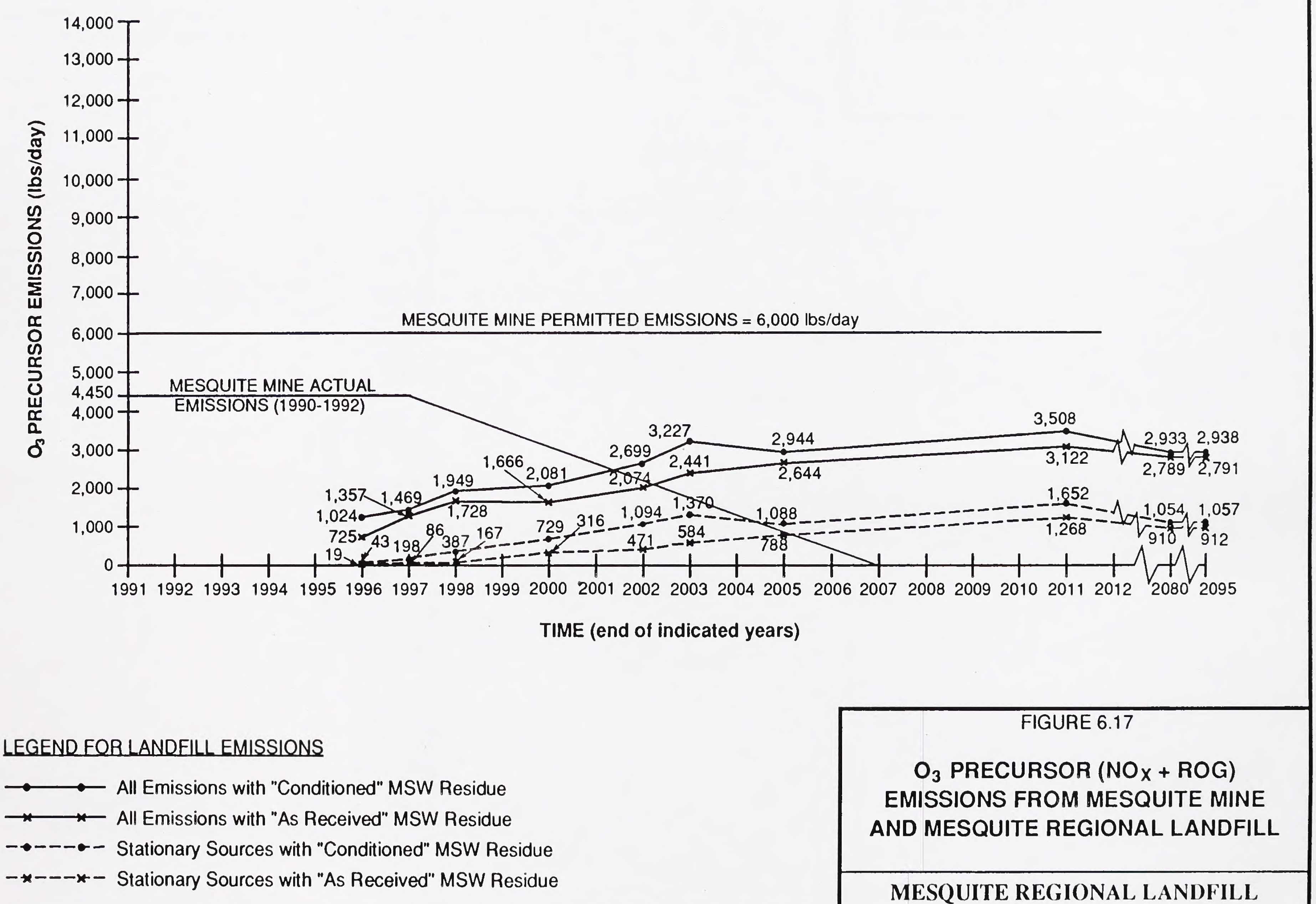


FIGURE 6.17

O_3 PRECURSOR (NO_X + ROG) EMISSIONS FROM MESQUITE MINE AND MESQUITE REGIONAL LANDFILL

MESQUITE REGIONAL LANDFILL

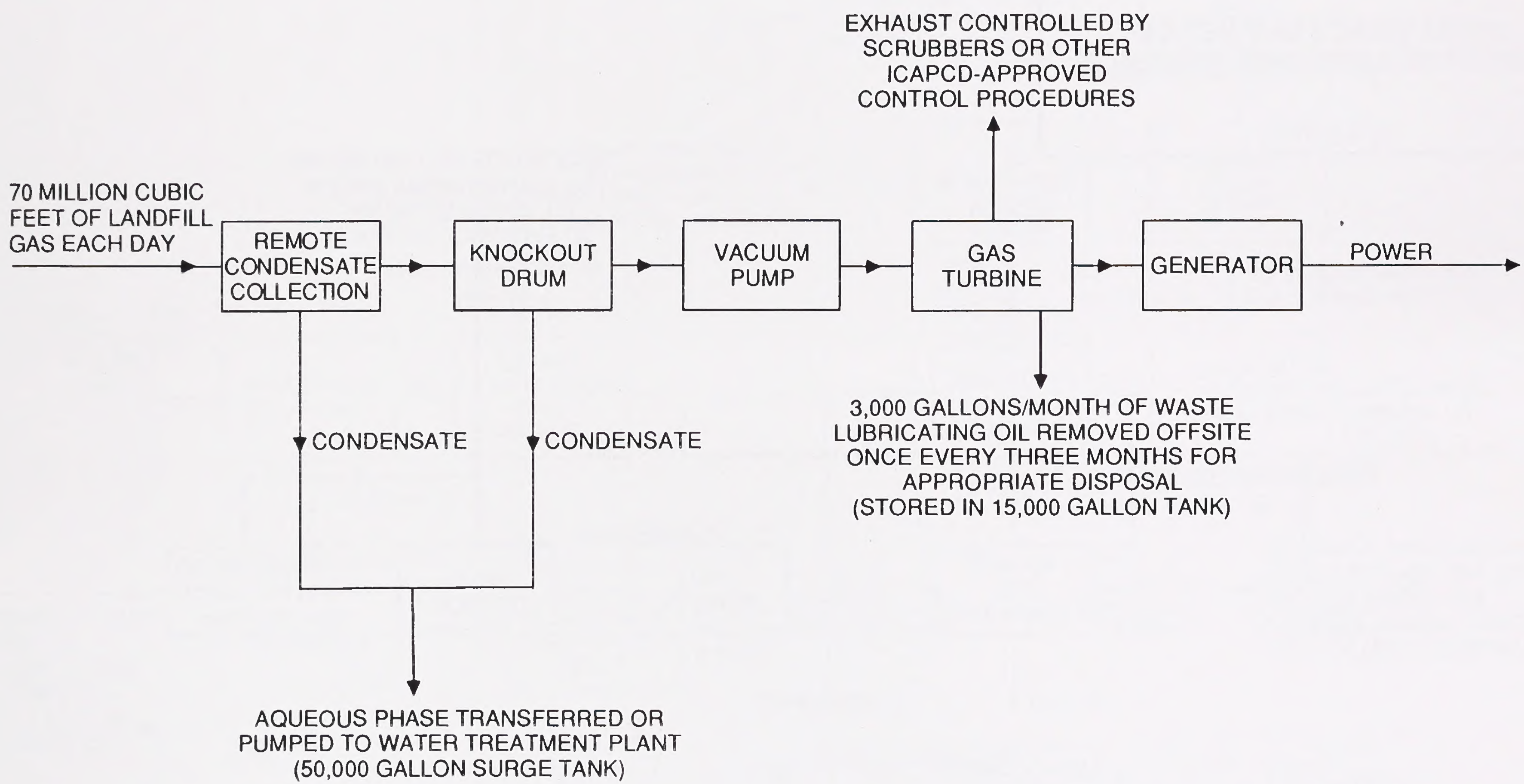


FIGURE 6.18

SCHEMATIC DIAGRAM FOR EXAMPLE GAS TURBINE POWER PLANT

MESQUITE REGIONAL LANDFILL

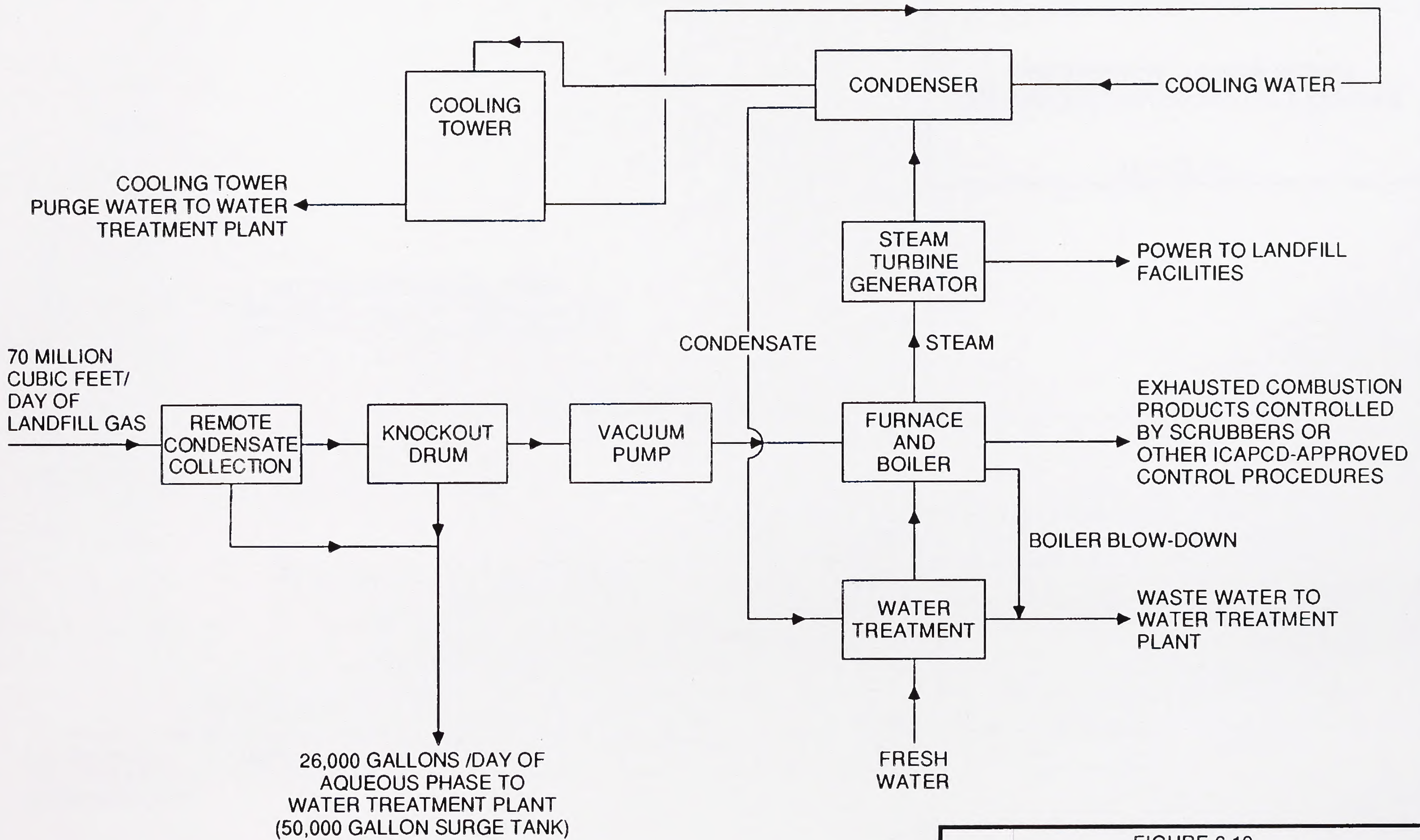


FIGURE 6.19

SCHEMATIC DIAGRAM FOR EXAMPLE BOILER AND POWER PLANT

MESQUITE REGIONAL LANDFILL

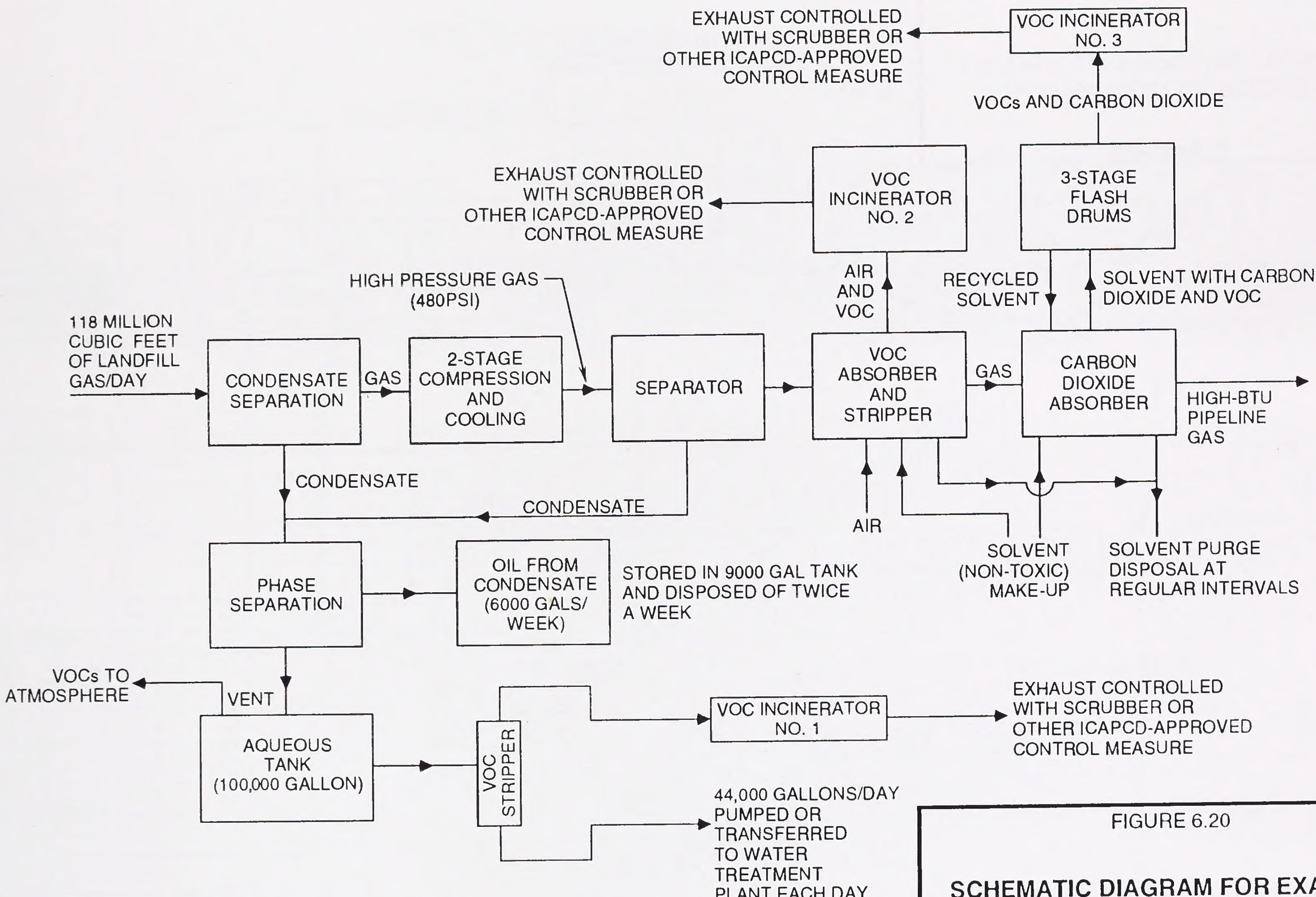


FIGURE 6.20

SCHEMATIC DIAGRAM FOR EXAMPLE COMPRESSED METHANE PLANT

MESQUITE REGIONAL LANDFILL

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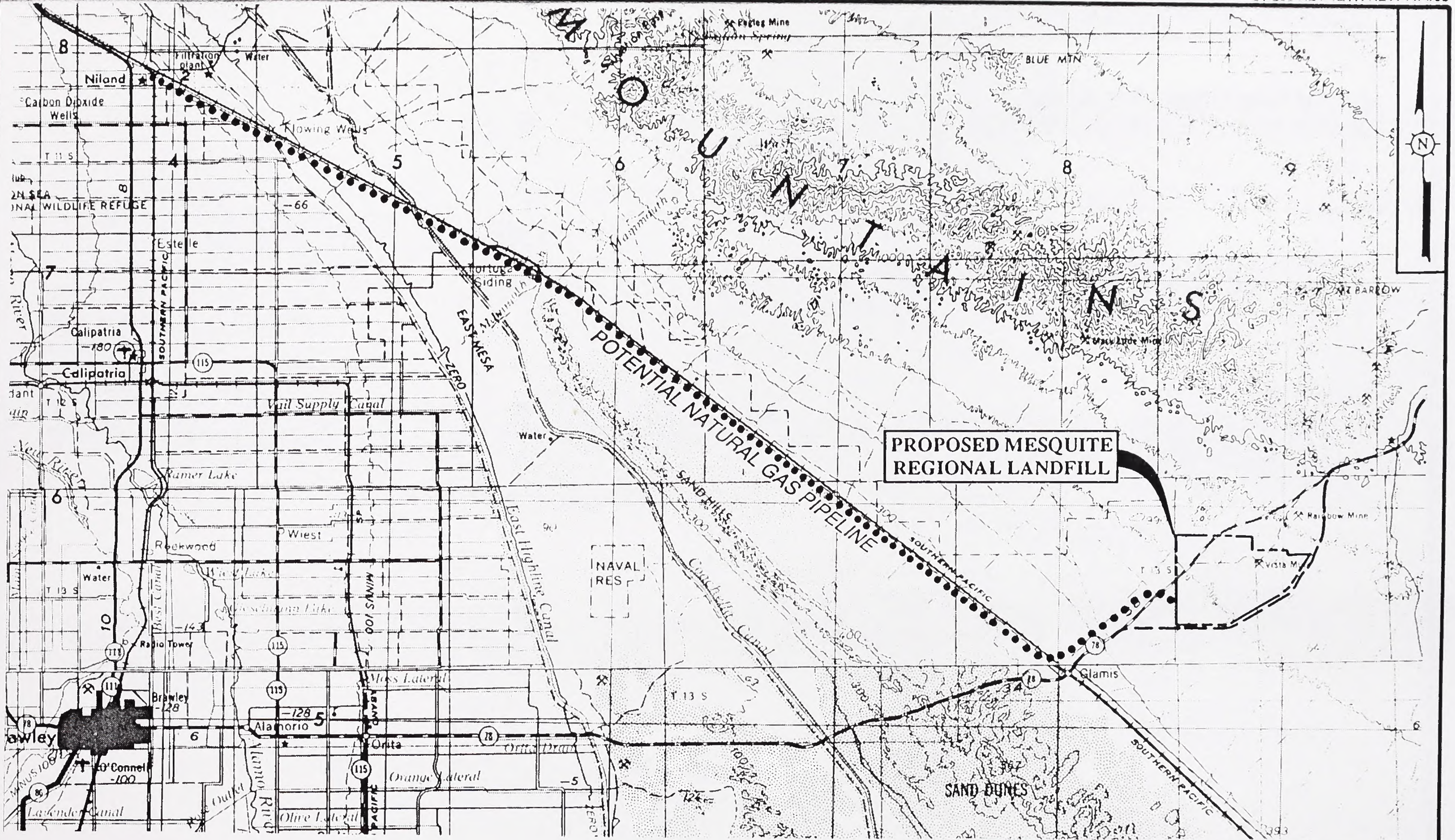

REFERENCE: USGS 1:250,000 MAPS OF EL CENTRO, CALIF.; ARIZ., DATED 1977, AND SALTON SEA, CALIF.; ARIZ., DATED 1969

FIGURE 6.21

ARRANGEMENT OF POTENTIAL NATURAL GAS PIPELINE TO NILAND

MESQUITE REGIONAL LANDFILL

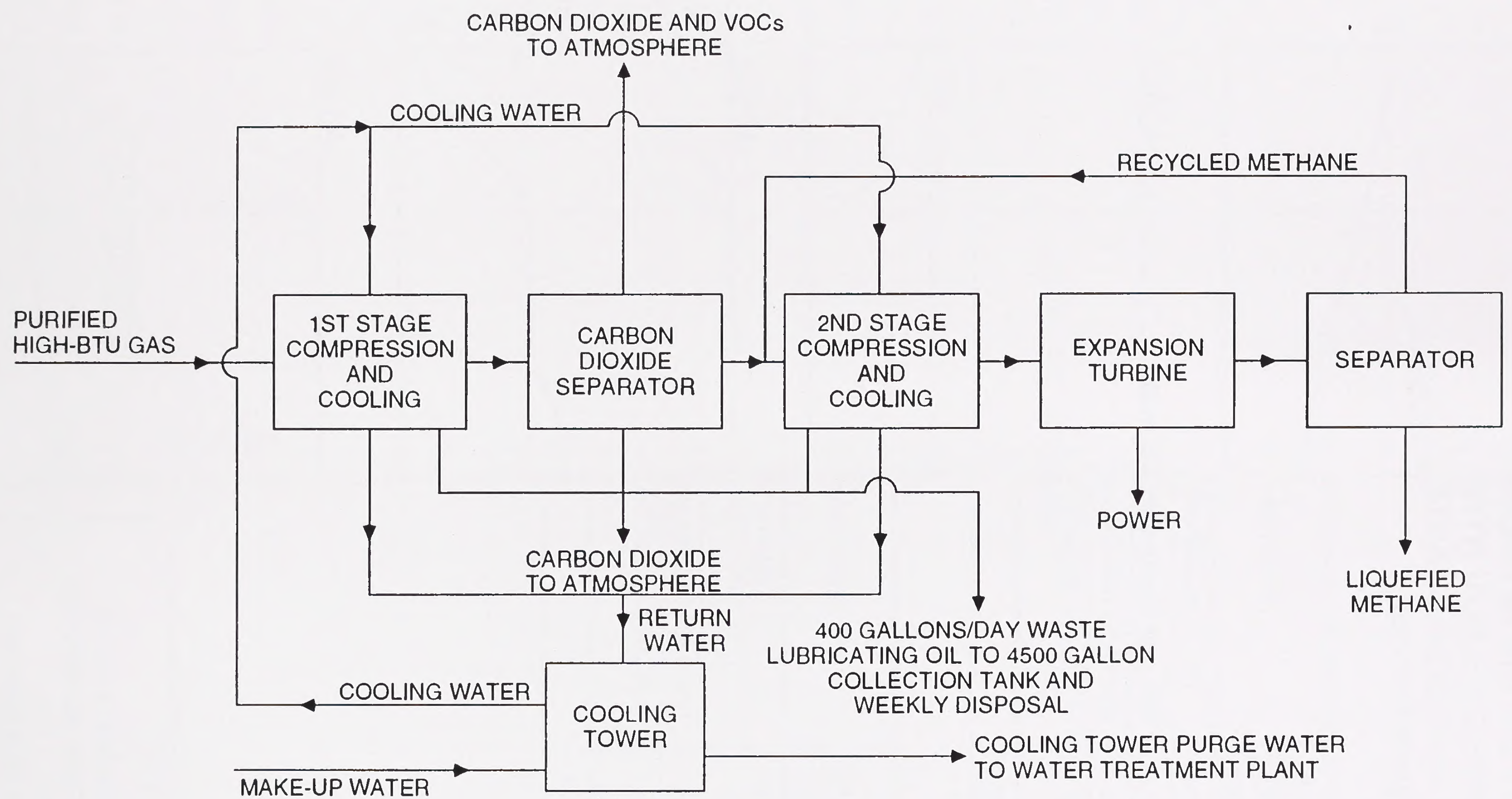

FIGURE 6.22

SCHEMATIC DIAGRAM FOR EXAMPLE LIQUEFIED METHANE GAS PLANT

MESQUITE REGIONAL LANDFILL

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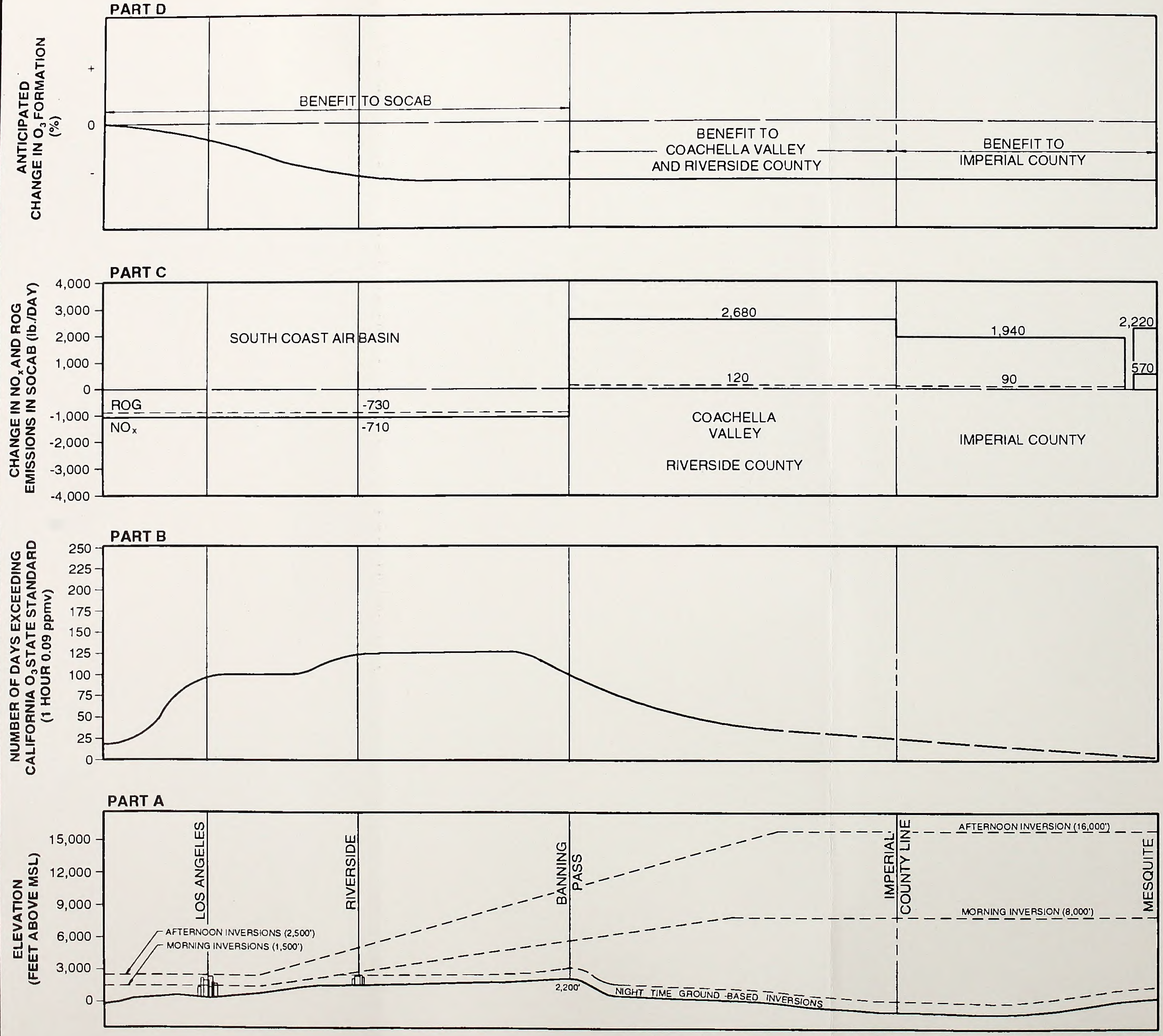

EMISSIONS IN SOCAB FOR YEAR 100 WITH BOILER/GENERATOR MESQUITE REGIONAL LANDFILL (pounds/day)

ACTIVITY	PROPOSED ACTION EMISSIONS IN SOCAB		
	NO_x	ROG	BOTH
TRANSFER TRUCKS AND LATC	870	140	1,010
TRAINS	2,610	120	2,730
LANDFILL BOILER AND FUGITIVES	0	0	0
LANDFILL EQUIPMENT EXHAUST AND FUGITIVES	0	0	0
TOTAL	**3,480**	**260**	**3,740**

ACTIVITY	NO ACTION EMISSIONS IN SOCAB		
	NO_x	ROG	BOTH
TRANSFER TRUCKS	1,910	370	2,280
TRAINS	0	0	0
LANDFILL BOILER AND FUGITIVES	830	360	1,190
LANDFILL EQUIPMENT EXHAUST AND FUGITIVES	1,450	260	1,710
TOTAL	**4,190**	**990**	**5,180**

FIGURE 6.23

EMISSIONS AND EFFECT ON OZONE OF PROPOSED ACTION VS. NO ACTION ALTERNATIVE

MESQUITE REGIONAL LANDFILL

91-296 REVAQTR REV. 3/9/93

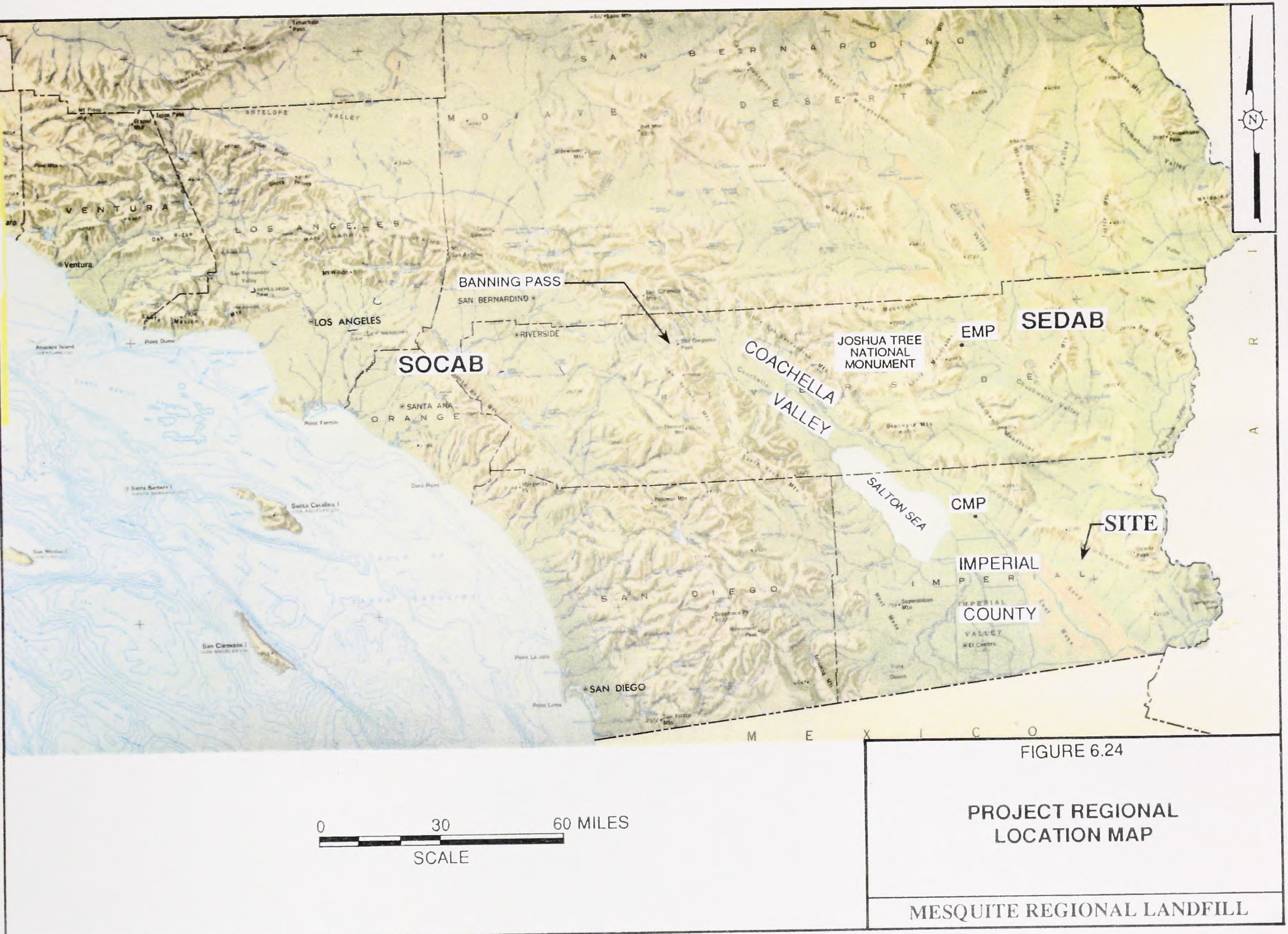

FIGURE 6.24

PROJECT REGIONAL LOCATION MAP

MESQUITE REGIONAL LANDFILL

APPENDICES

APPENDIX A

THEORY AND FORMULATION OF THE ESI GAS I LANDFILL GAS GENERATION MODEL

THEORY AND FORMULATION OF THE ESI GAS I LANDFILL GAS GENERATION MODEL

Prepared For:

VENTURA REGIONAL SANITATION DISTRICT

August 1993

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All Environmental Solutions, Inc. letterhead
and second sheet are recycled paper.

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(Continued)

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LIST OF FIGURES

1.0 INTRODUCTION

1. This document presents a technical discussion of Environmental Solutions, Inc.'s landfill gas (LFG) generation model, ESI GAS I. The model is comprised of: (1) a methodology developed by Environmental Solutions, Inc. to determine the methane generation potential of a unit of municipal solid waste (MSW) based on site-specific conditions; and (2) a first-order decay function, based on the Scholl Canyon model (EMCON, 1976, 1980), as summarized by the Solid Waste Association of North America (SWANA, 1991).

2. The model has been implemented as two spreadsheets. The first spreadsheet calculates methane generation potential per unit mass of MSW, based on waste composition and other site-specific factors related to moisture content of the MSW. The second spreadsheet prepares an LFG generation forecast based on calculated methane generation rates and site-specific factors defining the amount and rate at which MSW was disposed in the landfill.

3. Comparison of estimated versus actual LFG generation rates for the Santa Clara Landfill located in Ventura County, California indicates that the Environmental Solutions, Inc. GAS I model accurately estimates the trends observed in LFG collection system data. Modeled LFG generation over-estimates observed data collected at the Santa Clara Landfill by approximately 30 percent. This variance is assumed to be reflective of the following:
   - The model approximates LFG generation rate based on assumptions regarding waste composition and water content, and is considered to overestimate LFG generation.
   - LFG collection systems are not capable of collecting 100 percent of generated LFG. This results in fugitive LFG emissions through the surface of the landfill.

4. The remainder of this document presents a brief overview of the model and its formulation, a detailed technical description, model usage instructions, and the results of a case study performed for the Santa Clara Landfill.

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2.0 MODEL OVERVIEW

1. The ESI GAS I model is an extension and improvement of the Scholl Canyon model (EMCON, 1976, 1980), as summarized by SWANA (1991), and is comprised of two modules, one of which estimates the methane generation potential of a unit of MSW. The other module prepares an LFG generation forecast based on first order kinetics. This section presents a brief discussion of the assumptions and parameters critical to the formulation and function of the model. A detailed technical description of model formulation and equations is provided in Section 3.0.

2.1 METHANE GENERATION MODULE

1. The methane generation module of the ESI GAS I model uses information regarding the composition of MSW, the moisture content, and the precipitation rate to calculate the total potential amount of methane which could be generated from a unit mass of MSW. This information must be provided by the user and should be as site specific as practical.

2. The composition of the MSW is categorized into three decomposable fractions of organic material (food waste, vegetation waste, and paper waste), and a fourth non-decomposable, largely non-organic fraction (cans, bottles, etc.). The carbon content of each of the three decomposable fractions is approximated in the model by representing the different types of waste by a characteristic molecule. For food waste, the representative molecule is glucose, a simple sugar ($C_6H_{12}O_6$); for vegetation and paper waste, the representative molecule is cellulose, a biopolymer ($C_6H_{10}O_5$).

3. Based on the known composition of typical landfill gas and stoichiometry of anaerobic decomposition reactions, the model assumes that half the atoms of carbon in the representative molecule for each individual waste component are converted to carbon dioxide and the other half are converted to methane. Using this assumption, the model estimates the absolute maximum amount of landfill gas that could be generated by a unit mass of MSW. However, anaerobic decomposition also consumes water, so the maximum amount of gas which could be generated is also dependent on the moisture content of the MSW. The model assumes that water limits the gas generation potential in direct proportion to the moisture content of the waste on a wet basis.

4. In addition to decomposition of MSW, the relative importance of other sources and sinks of moisture were evaluated. The infiltration of precipitation during the period between initial placement of the MSW in the landfill and the placement of final cover on the MSW is considered the only significant additional source of moisture to the waste. The sinks of moisture which were evaluated, evaporation and breathing of the landfill, were considered to be either balanced by minor sources of water (i.e., aerobic decomposition) or negligible.

5. The methane generation module of the ESI GAS I model results in a calculated volume of the potential landfill gas generation potential for a unit mass of MSW. This volume is then used as input into the second module of the model, the LFG forecast module.

2.2 LFG FORECAST MODULE

1. The LFG forecast module uses the results of the first module with additional inputs such as the half life of the gas generation potential of the MSW, the operational history of the landfill, and the rate of MSW acceptance to calculate the generation rate of landfill gas within the entire landfill as a function of time.

2. The LFG forecast module is based on the Scholl Canyon model (EMCON, 1976, 1980), as reported by SWANA (1991), which is considered one of the simplest of the published models to utilize (WMNA, 1992). The Scholl Canyon model is based on the assumption that the gas production rate reaches a peak rate for a unit mass of MSW soon after placement of the waste in the landfill. The short time lag during which oxygen in the MSW is depleted by aerobic decomposition is neglected. The gas production rate for a unit mass of MSW is then assumed to decrease according to first order kinetics (i.e., exponential decay) as the amount of decomposable organic material remaining from the initial placement of the waste diminishes.

3. The landfill gas generation rate at any time can be calculated by summing the individual contributions of landfill gas from each unit mass of MSW during an incremental time period. The model uses an equation which was developed by integrating over all unit masses of MSW in the landfill and assuming a constant rate of MSW accumulation in the landfill to perform this summation.

3.0 TECHNICAL DESCRIPTION

1. The ESI GAS I model has been developed to estimate the methane and LFG generated by MSW in landfills operating under varying moisture and waste flowrate conditions. The model is an extension and improvement on the Scholl Canyon model (EMCON, 1976, 1980), as summarized by SWANA (1991), which generates a time-dependent LFG generation rate based on the amount of waste in the landfill and the operational status of the landfill. The Scholl Canyon model assumes that generation of LFG by MSW follows first order kinetics. This means that the rate of LFG generation at any time is proportional to the remaining decomposable MSW mass.

2. The ESI GAS I model improves upon the Scholl Canyon model by predicting the total amount of gas produced per unit of MSW according to the composition, moisture content, compaction ratio of the waste, and the infiltration of precipitation. The model is comprised of two modules, the methane generation module, which estimates the methane generation potential of a unit of MSW, and the LFG forecast module, which uses the result of the first module to estimate LFG generation.

3. The ESI GAS I model focuses on the processes that have the greatest effect on LFG generation and are subject to landfill management control. The following discussion presents the technical basis for development of the ESI GAS I model, and is organized as follows:
   - Section 3.1 - Methane Generation Module:
     - Section 3.1.1: The composition of solid waste is characterized and simplifying assumptions are made regarding the chemistry and biodegradation of the various components.
     - Section 3.1.2: The role of water in the waste is taken into account. Precipitation and infiltration of water into the waste is conceptualized and parameterized for incorporation in model equations.
   - Section 3.2 - LFG Forecast Module: The first order kinetics of LFG generation, which are part of the Scholl Canyon Model, are briefly summarized.

4. A list of symbols and dimensions of variables used in the following discussion is provided in Appendix A.

3.1 METHANE GENERATION MODULE

1. This section characterizes MSW composition and moisture content, and derives an equation which is based on MSW composition and moisture content to calculate the potential LFG generation for a unit mass of MSW.

3.1.1 COMPOSITION OF SOLID WASTE

1. SWANA has published data on typical MSW composition. This information was simplified by categorizing the various constituents of MSW into three decomposable components (food, vegetation, and paper), and a fourth component which includes nonmethane producing, generally nonorganic materials such as plastics, metals, and glass. Table 1 presents the results of a waste stream categorization which has been performed pursuant to the initial development of this model. This categorization of MSW allows for taking into account materials recovery as required by the California Integrated Solid Waste Management Act of 1989 (AB 939).

2. For the purposes of evaluating LFG generation, anaerobic decomposition can be viewed as the conversion of carbon in the MSW components to methane (CH_4) and carbon dioxide (CO_2). Only the three decomposable components listed in Table 1 will contribute carbon to LFG. Each of the three decomposable components is a complex mixture of molecules. Complete chemical characterization of the components would be infeasible for the purposes of a gas generation model. However, simplifying assumptions can be made regarding the general chemical characteristics common to decomposable organic matter.

3. Based on the work of Tchobanoglous, et al. (1977) and its presentation by Schumacher (1983), the general reaction for the carbon, hydrogen, and oxygen atoms in the organic molecules of the three organic MSW components can be represented by:

$$C_{a_i} H_{b_i} O_{c_i} + ([4a_i - b_i - 2c_i]/4)\, H_2O \xrightarrow[\text{decomposition}]{\text{anaerobic}} ([4a_i + b_i - 2c_i]/8)\, CH_4 + ([4a_i - b_i + 2c_i]/8)\, CO_2 \quad (1)$$

where i = index number for a component of the solid waste (i.e., 1 = food, 2 = vegetation, 3 = paper, and 4 = non-organic materials such as cans, bottles, etc.).

4. Based on Equation 1, a_i molecules each of methane and CO_2 are generated from two molecules of $C_{a_i}H_{b_i}O_{c_i}$. This assumes that sufficient water is available for bacteria to complete this reaction. Following SWANA (1991), it is assumed in this model that methane comprises half

the LFG (on a volume or molar basis) at the point of generation. Other reactions and mechanisms can affect the specific composition of LFG, such as the dissolution of carbon dioxide in water or leachate, or abiotic reactions of the various LFG components (refer to Sections 3.1.2 and 3.1.2.2).

5. The ESI GAS I model assumes a representative molecule for each component of the MSW. Food waste is represented by the molecular composition of a basic sugar, $C_6H_{12}O_6$, while paper/cardboard and vegetative waste in the two other organic components is represented by the molecular composition of cellulose, $C_6H_{10}O_5$, suggested by Bookter and Ham (1982). For these representative organic molecules, $a_i = 6$ for $i = 1,2,3$, and $a_4 = 0$.

6. Derivation of model equations is based on an incremental unit mass of MSW m that is landfilled during a specific time period. The unit mass m contains the four components in user defined proportions and a specified amount of moisture which is apportioned to the four components based on user-supplied specifications. If the dry organic mass in each solid waste component i is represented by m_{d_i}, and the molecular weight of the organic molecule selected to typify the component i is represented by M_i, then the number of moles n_i of organic compound available to react with water is given by:

$$n_i = m_{d_i} / M_i \tag{2}$$

where $M_i = 12a_i + b_i + 16c_i$.

7. Using the assumption that one half the carbon atoms in a component of waste is converted to methane, the maximum number of moles of methane which could potentially be generated by complete reaction of the organic matter can be calculated using:

$$n_{CH4_i} = (a_i/2)n_i = (a_i/2)m_{d_i} / M_i \tag{3}$$

8. Equation 3 calculates the maximum amount of methane that can be produced from the dry organic mass based on carbon content. Decomposition of many organic compounds consumes water, and as shown in Equation 1, anaerobic decomposition requires water. Further, water is needed to create an environment for anaerobic microbes to function. Therefore, the next step in the development of the model, discussed in Section 3.1.2 of this document, is to account for the limiting effect of water on the amount of gas generated.

3.1.2 EFFECT OF MOISTURE

1. The ESI GAS I model assumes that moisture content of MSW is critical to the decomposition process. There are three sources of moisture to landfill MSW:
   - Initial moisture content in landfilled waste.
   - Infiltration of precipitation through daily and intermediate cover.
   - Moisture added during the brief period immediately following landfilling when the waste is decomposing aerobically (aerobic decomposition generates primarily CO_2 and water).

2. The first two of these three sources (i.e., initial moisture content and infiltration of precipitation) are the most significant in determining the moisture of the waste if the landfill is being operated properly (proper placement of daily cover, proper design of drainage diversion structures, etc.). The third source (i.e., moisture added via aerobic decomposition) is considered to be relatively minor, and is assumed to balance potential losses of water by the processes discussed in Section 3.1.2.2. Therefore, the model considers only initial moisture content and infiltration of precipitation. The initial moisture content can be measured or estimated from available data. Table 1 displays an assumed distribution of average wet-basis moisture content for each of the four MSW components as they are received at the landfill. Moisture content data presented in Table 1 have been developed based on information provided by SWANA (1991).

3. For the purposes of model formulation, the moisture content on a wet basis W_{w_i} of a waste component i is represented by:

$$W_{w_i} = m'_i/(m_{d_i} + m'_i) \qquad (4)$$

where m'_i is the mass of water in MSW component i. W_{w_i} has the range $0 \leq W_{w_i} \leq 1$.

4. Studies by DeWalle, et al. (1978); Ramaswamy (1970); Merz and Stone (1968); Merz (1964); Pfeffer (1973); Rovers and Farquhar (1973); and Cooney and Wise (1975) show that the total volume of LFG generated by a unit mass of dry MSW is dependent on the moisture content of the waste. For the present derivation of the ESI GAS I model, it has been assumed that the total potential amount of LFG generated is directly proportional to the moisture content on a wet basis. Using this assumption as an approximation to account for the effect of water on LFG generation, Equation 3 becomes:

$$n_{CH4_i} = (a_i/2M_i)m_{d_i} W_{w_i} \qquad (5)$$

when applied to the individual MSW components. It should be noted that as W_{w_i} increases in value, the gas generation potential approaches its absolute maximum potential value (Equation 3).

5. Having established the above relationship of methane generation to MSW moisture content, it is necessary to determine the potential effects that precipitation and water loss (via evaporation and breathing of the landfill) may have upon the above relationship. These effects are evaluated in Sections 3.2.1 and 3.2.2.

3.1.2.1 <u>Infiltration Of Precipitation</u>

1. During the normal lifetime of a landfill, MSW is placed in cells, and at the end of each day exposed MSW is covered with approximately 6 inches of soil. A landfill contains layers (or lifts) of cells, and each lift will remain in the topmost position (nearest the atmosphere) for some period of time. Depending upon specific operating conditions, either a 6-inch layer of daily cover or a 1-foot thick layer of intermediate cover soil will be placed over the solid waste. Daily and intermediate cover, unlike final cover, are not designed to be impermeable to precipitation. The model allows the user to specify that a fixed portion (e.g., 30 percent) of precipitation will penetrate daily and intermediate cover and permeate the solid waste layer. It is assumed that the moisture will be distributed in the three organic components (i.e., food, vegetation, and paper) in direct proportion to the dry mass of each organic component available to absorb and use it.

2. The wet-basis moisture content W_{w_i} will increase if precipitation penetrates the soil cover into the MSW. The original mass of water in the MSW components is found from Equation 4 to be expressed as:

$$m'_i = m_{d_i} W_{w_i} /(1-W_{w_i}) \qquad (6)$$

3. Precipitation P is measured in inches per year. The mass of precipitation m_p falling on a column of unit mass of MSW that has a top area A, and successfully infiltrating the landfill to be distributed throughout the three decomposable components is given by:

$$m_p/A = bPD'E \qquad (7)$$

where:

b = fraction of precipitation that infiltrates the landfill
D' = density of water (62 lbs/cu ft)
E = exposure period (time that MSW layer is in topmost position)

4. Before precipitation infiltrates the surface of the landfill, the mass m of MSW underlying the surface area A in the cell layer is given by:

$$m/A = D\,h \qquad (8)$$

where D = density (or compaction) of solid waste (e.g., 1,200 lbs/cu yd), and h = depth (thickness) of the lift. Both of these parameters must be specified by the user.

5. The mass of infiltrating precipitation per unit mass of solid waste from each inch of precipitation is determined by dividing Equation 7 by Equation 8:

$$m_p/m = (D'/D)(bPE/h) \qquad (9)$$

The amount of precipitation that will be added to a unit mass of each organic component m_{p_i} is given by:

$$m_{p_i}/m = (D'/D)\,(bPE/h)\,(m_{d_i} / \sum_{i=1}^{i=3} m_{d_i}) \quad i=1,2,3 \qquad (10)$$

where Σ is the summation over the index i, and $m_{p4} = 0$.

6. Therefore, the total water in each component after precipitation m^*_i is given by:

$$m^*_i = m'_i + m_{p_i} \qquad (11)$$

and the new wet-basis moisture content $W_w{}^*_i$ is given by:

$$W_w{}^*_i = m^*_i /(m_{d_i} + m^*_i) \qquad (12)$$

$$= (m'_i + m_{p_i})/(m_{d_i} + m'_i + m_{p_i})$$

7. Equation 5 can now be rewritten to include the effect of precipitation and is given by:

$$n_{CH4i} = (a_i/2)m_{d_i}\,W_w{}^*_i \,/\, M_i \qquad (13)$$

8. Based on the assumption that anaerobic decomposition of MSW results in one carbon dioxide molecule for each methane molecule generated, the total moles of LFG generated n_{LFG_i} can be determined by multiplying Equation 13 by two:

$$n_{LFG_i} = a_i m_{d_i}\,W_w{}^*_i \,/\, M_i \qquad (14)$$

9. The volume of methane V_i generated by each MSW component, and potentially released to the atmosphere at reference temperature (70° F), and pressure (1 atmosphere = 14.7 psia) is related to the number of moles of methane by the equation:

$$V_i = k' \, n_{CH4i} \tag{15}$$

where k' = 386 cubic feet per pound-mole (volume of one mole of an ideal gas at reference temperature and pressure).

10. The total volume V_{CH4} of methane generated by the three organic components is given substituting Equation 13 into Equation 15 and summing the volumes over each of the decomposable waste components:

$$V_{CH4} = \sum_i V_i = k' \, \Sigma n_{CH4i} \tag{16}$$

$$= (k'/2) \sum_i a_i m_{d_i} \, W_{w^*i} \, / \, M_i$$

11. If G_{CH4} is the total methane generated by a unit mass m of MSW, then:

$$G_{CH4} = V_{CH4}/m = (k'/2m) \sum_i a_i \, m_{d_i} \, W_{w^*i} \, / \, M_i \tag{17}$$

and the total LFG generated by this same unit mass of MSW is given by:

$$G_{LFG} = 2G_{CH4} = (k'/m) \sum_i a_i \, m_{d_i} \, W_{w^*i} \, / \, M_i \tag{18}$$

3.1.2.2 Water Losses From MSW

1. There are two principal mechanisms in addition to anaerobic decomposition which can remove water from the MSW: evaporation and breathing of the landfill. The original moisture in MSW as received at the landfill is located at an average depth of 5 to 10 feet in a landfill of typical 10- to 20-foot thick lifts, plus an additional 6 inches to 1-foot for the thickness of the daily or intermediate cover. For water in the MSW to be lost by evaporation, water in the topmost lift must evaporate and diffuse an average distance of 6 to 11 feet to escape from the surface. Based on hydrologic data, the maximum soil depth from which losses by evaporation may occur ranges from 1 to 3 feet below ground surface, depending upon vegetative cover, solar radiation, and other variables. Therefore, the ESI GAS I model assumes that there is no significant loss of moisture by evaporation.

2. Breathing of the landfill is caused by atmospheric pressure changes. Typical changes associated with the passage of warm and cold fronts are about 5 mm Hg, which is 0.7 percent of one atmosphere. Decreasing atmospheric pressure causes LFG which is saturated with water vapor to be withdrawn from the landfill. Increasing atmospheric pressure causes ambient air to be pumped into the landfill. As compared to LFG within the landfill, ambient air is very dry. The effect of pumping water-rich gas out of the landfill and water-poor air into the landfill is a net loss of water from the landfill.

3. Atmospheric pumping would also introduce oxygen into the landfill. The oxygen may cause aerobic decomposition to occur in MSW located just under the cover soil. Water production by aerobic decomposition may or may not exceed the water loss due to atmospheric pumping. Insufficient information is available to compare these water losses and gains. Therefore, it has been assumed that the net effect on moisture content due to these processes is either balanced or negligible.

3.2 LFG GENERATION MODULE

1. The preceding discussion detailed the development of a methodology for characterization of MSW composition and moisture content, and derived an equation (Equation 18) to calculate the total potential LFG generation G_{LFG} for a unit mass of MSW. This section discusses integration of the estimated total potential LFG generation into an established model for calculating gas generation for the whole landfill.

2. The Scholl Canyon model (EMCON, 1976, 1980), as reported by SWANA (1991) is considered one of the simplest of the published models to utilize (WMNA, 1992), and was selected for incorporation in the ESI GAS I model because first order kinetics accurately describe many chemical reactions in which the rate is proportional to the remaining decomposable mass remaining Zison (1990). A brief discussion of the Scholl Canyon model is presented here. A thorough discussion of the model derivation and limitations is presented in EMCON (1976) and EMCON (1980).

3. The Scholl Canyon model is based on the assumption that the gas production reaches a peak rate for a unit mass of MSW soon after placement of the waste in the landfill. The short time lag during which oxygen in the MSW is depleted by aerobic decomposition is neglected.

The gas production rate for a unit mass of MSW is then assumed to decrease according to first order kinetics as the amount of organic material remaining from the initial placement of the waste diminishes.

4. By dividing a landfill into unit masses of MSW which are placed in the landfill during a specified increment of time, and assuming that the MSW acceptance rate is constant over the lifetime of the landfill phase being evaluated, the implementation of the Scholl Canyon model used in the ESI GAS I model can be written as:

$$Q_{LFG} = G_{LFG} R (e^{-kN} - e^{-kt}) \quad (19)$$

where:

Q_{LFG} = LFG generation rate at time t, ft^3/day
G_{LFG} = total LFG generation capacity
R = MSW flowrate, tons/day
k = LFG generation constant for MSW, yr^{-1}
N = time since landfill closure, yr
t = time since the initial MSW placement, yr

5. G_{LFG} is calculated using Equation 18. N is assumed to be 0 for the period when the landfill is active. The LFG generation constant k is defined as:

$$k = \ln(2)/t_{1/2} \quad (20)$$

where $t_{1/2}$ is the LFG half life (i.e., time necessary for a unit of MSW to exhaust one half of its LFG generation potential). The half life must be determined based on site-specific conditions such as moisture content, temperature, and waste composition.

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4.0 MODEL USAGE INSTRUCTIONS

1. The ESI GAS I model has been implemented as two computer spreadsheets. The first spreadsheet calculates methane generation potential per unit of MSW, and the second spreadsheet prepares an LFG generation forecast. The technical basis for these computational tools is discussed in Sections 2.0 and 3.0 of this document. The spreadsheets have been developed using Microsoft Excel, Version 4.0, on an Apple Macintosh computer system, but are transportable to other software/hardware environments. This section briefly discusses usage of the spreadsheets.

4.1 METHANE GENERATION SPREADSHEET

1. The purpose of the methane generation spreadsheet is to provide the user with a methodology to estimate methane generation per unit of MSW for a given set of site-specific conditions. Since most landfills consist of discrete phases that have different operational characteristics, the user is encouraged to create a unique methane generation spreadsheet for each discrete landfill phase. The present model implementation will allow for creation of spreadsheets for up to ten landfill phases.

2. An example methane generation spreadsheet is presented in Appendix B. The spreadsheet has been designed to account for the different waste composition distributions which may occur due to implementation of AB 939. Areas of shading in the spreadsheet indicate parameters which must be entered by the user. Other fields are calculated automatically by the spreadsheet.

3. The following parameters must be input by the user to the methane generation spreadsheet:
   - Site name
   - Site location
   - Landfill phase
   - MSW compaction (pounds per cubic yard)
   - Exposure time of MSW layer in the topmost position of the landfill (years)
   - Height (thickness) of the MSW lift
   - Fraction of precipitation which infiltrates the landfill
   - Annual precipitation (inches per year)
   - Percentage of food, paper, and vegetation in the waste stream
   - Moisture content (percent) of food, paper, and vegetation in the waste stream

4. Based on the above input data, the spreadsheet calculates a total estimated methane generation rate per unit MSW (cubic feet of methane per pound of MSW). This value must be entered by the user in the LFG forecast spreadsheet, as described in Section 4.2 of this document.

4.2 LFG FORECAST SPREADSHEET

1. The purpose of the LFG forecast spreadsheet is to estimate LFG generation over time for a given set of site-specific conditions. As noted in Section 4.1, most landfills consist of discrete phases having differing operational characteristics. Therefore, the LFG forecast spreadsheet has been organized to allow entry of LFG generation parameters for up to ten discrete landfill phases. The spreadsheet calculates individual and cumulative time dependent landfill gas generation for each landfill phase entered by the user.

2. An example LFG forecast spreadsheet is presented in Appendix B. Areas of shading in the spreadsheet indicate parameters which must be entered by the user. Other fields are calculated automatically by the spreadsheet.

3. The following parameters must be input by the user to the LFG forecast spreadsheet for each discrete landfill phase:
   - Start of landfilling operation (month, day, year)
   - End of landfilling operation (month, day, year)
   - Days of landfill operation per year
   - Waste flowrate (tons per day)
   - Waste in place (million tons)
   - Methane half life (i.e., time required for a unit of MSW to emit one half of its potential methane.
   - Total estimated methane generation rate per unit MSW (cubic feet of methane per pound of MSW). This value is calculated by the methane generation spreadsheet (Section 4.1).

4. Based on the above input data, the spreadsheet prepares a table of LFG generation rate by landfill phase and month. The user may extract data presented in this table to prepare an LFG generation curve similar to the one shown in Table 1.

5.0 CASE STUDY

1. As part of a model validation effort, the ESI GAS I model was applied using LFG generation data supplied by Pacific Energy (PE) to the Ventura Regional Sanitation District (VRSD) for the Santa Clara Landfill located in Ventura County, California (VRSD, 1993). The Santa Clara Landfill was operated between January 1961 and June 1982. It was selected for these analyses because the landfill has been closed since 1982, and few modifications have been made to the LFG collection system since its installation. LFG produced by the landfill is collected and destroyed using internal combustion engines, and several years of LFG generation data are available.

2. Methane generation and LFG forecast spreadsheets developed for this analysis are provided in Appendix B. The Santa Clara Landfill was modeled in two discrete phases (January 1961 through June 1977, and July 1977 through June 1982) on the basis of differences in landfill operations between the two phases. Estimated methane half life input to the spreadsheets was based on the observation that actual LFG recovery at the Santa Clara Landfill dropped by 50 percent after approximately 8.5 years. Other parameters input to the spreadsheets were developed on the basis of PE records for operation of the Santa Clara Landfill. Gas collection data recorded for the Santa Clara Landfill between February 1988 and July 1993 are summarized in Appendix B.

3. Figure 1 displays a comparison of estimated versus actual LFG generation rates for the Santa Clara Landfill. Data summarized in the figure indicate that the ESI GAS I model accurately estimates the trends observed in LFG collection system data. Modeled LFG generation over-estimates observed data by approximately 30 percent. This variance is assumed to be reflective of the following:
   - The model approximates LFG generation rate based on assumptions regarding waste composition and water content, and is considered to overestimate LFG generation.
   - LFG collection systems are not capable of collecting 100 percent of generated LFG. This results in fugitive LFG emissions through the surface of the landfill.

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TABLE 1

SIMPLIFIED COMPOSITION OF MUNICIPAL SOLID WASTE

COMPONENT	INDEX (i)	MOISTURE CONTENT[1] ON WET BASIS (%)	AMOUNT[1] IN MUNICIPAL SOLID WASTE (%)	AMOUNT IN MSW WITH RECYCLING (%)
Food Waste	1	70	10	13
Paper/Cardboard	2	6	40	31
Vegetative Waste	3	60	18	16
Remainder	4	6	32	40
		TOTAL	100	100

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(1) SWANA, 1991.

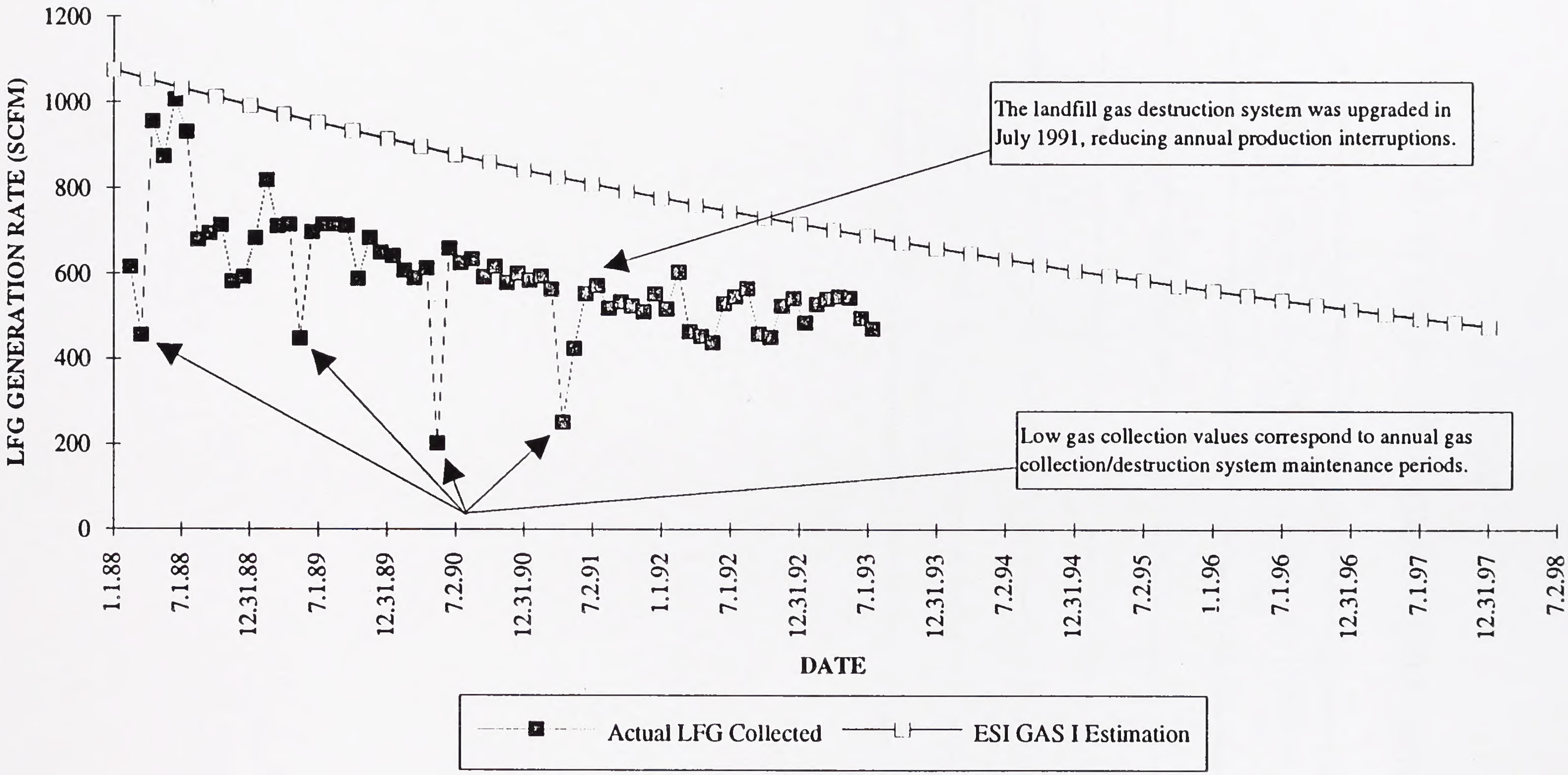

FIGURE 1
COMPARISON OF ACTUAL AND ESTIMATED LFG GENERATION RATE
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APPENDIX A

LIST OF SYMBOLS AND DIMENSIONS OF VARIABLES

APPENDIX A
LIST OF SYMBOLS AND DIMENSIONS OF VARIABLES[a]

A	Unit area of topmost landfill level exposed to precipitation (L^2).
a_i	Number of carbon atoms in organic molecule representing MSW residue organic component i (--).
b	Fraction of precipitation falling on landfill that infiltrates cover into the MSW residue (--).
b_i	Number of hydrogen atoms in organic molecule representing MSW residue organic component i (--).
c_i	Number of oxygen atoms in organic molecule representing MSW residue organic component i (--).
D	Density of MSW residue (ML^{-3}).
D'	Density of water (ML^{-3}).
E	Period of time MSW layer in topmost position is exposed to precipitation (T).
G_{CH_4}	Total CH_4 generated by unit mass of MSW ($L^3\ M^{-1}$).
G_{LFG}	Total landfill gas generated by unit mass of MSW ($L^3\ M^{-1}$).
h	Depth (thickness) of landfill topmost layer during one year of precipitation (L).
i	Subscript indicating MSW residue component (e.g., food, vegetation, paper, or non-organic compounds).
k	Coefficient of exponent in temporal curve for LFG generation (T^{-1}).
k'	Volume of one mole of ideal gas at reference temperature (70° F) and pressure (1 atmosphere = 14.7 psia) (L^3 mole^{-1}).
m	Unit mass of MSW residue (M).
m_p	Mass of precipitation falling on a column of unit mass of MSW that has a top area A during exposure period E (M).
m_{p_i}	Precipitation that will be added to a unit mass of each organic component i (M).
m_{di}	Dry organic mass in unit mass of MSW component i.
m'_i	Mass of water in unit mass of MSW component i.
m^*_i	Mass of water in unit mass of MSW component after infiltration.
M_i	Molecular weight of MSW component i (M, mole^{-1}).
N	Time since landfill closure (years, T).
n_i	Number of moles of organic component i in unit mass of MSW available to react with water.
$n_{CH_{4i}}$	Number of moles of methane (CH_4) generated by complete reaction of organic molecules in organic component i per unit mass of MSW.
n_{LFG}	Number of moles of LFG generated by complete reaction of organic molecules in organic component i per unit mass of MSW.

P	Annual precipitation on landfill (LT^{-1}).
Q_{LFG}	Time dependent volume rate of total LFG generation ($L^3\ T^{-1}$).
R	MSW flowrate (tons/day, MT^{-1})
t	Time (T).
$t_{1/2}$	Half-life of decomposable organic matter (T).
V_{CH_4}	The total volume of methane generated by the three organic components (L^3).
V_i	Volume of CH_4 generated by each organic component i per unit mass MSW ($L^3\ M^{-1}$).
W_{w_i}	Moisture proportion of MSW component i on wet basis (--).
$W_{w\ i}^{*}$	Moisture proportion of MSW component i on wet basis after infiltration (--).

[a] Dimension abbreviations: L = length, M = mass, T = time, -- = dimensionless.

APPENDIX B

CASE STUDY SANTA CLARA LANDFILL VENTURA, CALIFORNIA

MSW LANDFILL METHANE GENERATION RATE

I) SITE INFORMATION:

Parameter	Value
Site Name	Santa Clara
Site Location	Oxnard Ca.
Landfill Phase	Early Filling ('61 - 76)
Date	8/18/93
Notes	(1)

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	900	lb/cubic yard	(1),(2)
Exposure Time of MSW Layer in Topmost Position	8	years	(1),(2)
Height (thickness) of MSW Cell/Lift	15	feet	(1),(2)
Infiltration Fraction	45%	percent	(1)
Precipitation	14.5	inches/year	(1)

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole)	Carbon Atoms Per Molecule	Composition of Waste Stream (%)	Mass of Waste Component Per Unit Wet MSW (lb)	Wet Basis Moisture Content (%)	Dry Mass Per Unit MSW (lb)	Water Mass Per Unit MSW (lb)	Precipitation Mass Deposited on Unit Area (lb)	Wet Basis Moisture Content After Infiltration (%)	Total LFG Generated Per Unit MSW (moles)	CH4 Generated Per Unit MSW (cu ft/lb)	Notes
			[M]	[a]	[C]	[m = C/100]	[Ww]	[md = m * ((1-Ww)/100)]	[m' = m - md]	[mp]	[Ww*=(m'+mp)/(md+m'+mp)]	[n = a * md * Ww* / 100 / M]	[G]	(3)
A) Pre-1995 (Prior to Implementation of AB 939):														(4)
1	Food	C6H12O6	180	6	10	0.10	70	0.03	0.07	3.39E-02	77.59	7.76E-04	0.15	
2	Paper	C6H10O5	162	6	40	0.40	6	0.38	0.02	4.24E-01	54.39	7.57E-03	1.46	
3	Vegetation	C6H10O5	162	6	18	0.18	60	0.07	0.11	8.12E-02	72.44	1.93E-03	0.37	
4	Remainder	Inorganic	NA	0	32	0.32	6	0.30	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.78	0.22	5.39E-01	NA	1.03E-02	1.98	
B) 1995 - 1999 (25 Percent Waste Reduction - AB 939):														(4)
1	Food	C6H12O6	180	6	13	0.13	70	0.04	0.09	4.40E-02	77.59	1.01E-03	0.19	
2	Paper	C6H10O5	162	6	31	0.31	6	0.29	0.02	3.29E-01	54.39	5.87E-03	1.13	
3	Vegetation	C6H10O5	162	6	16	0.16	60	0.06	0.10	7.22E-02	72.44	1.72E-03	0.33	
4	Remainder	Inorganic	NA	0	40	0.40	6	0.38	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.77	0.23	4.45E-01	NA	8.60E-03	1.66	
C) 2000, and Beyond (50 Percent Waste Reduction - AB 939):														(4)
1	Food	C6H12O6	180	6	20	0.20	70	0.06	0.14	6.77E-02	77.59	1.55E-03	0.30	
2	Paper	C6H10O5	162	6	20	0.20	6	0.19	0.01	2.12E-01	54.39	3.79E-03	0.73	
3	Vegetation	C6H10O5	162	6	16	0.16	60	0.06	0.10	7.22E-02	72.44	1.72E-03	0.33	
4	Remainder	Inorganic	NA	0	44	0.44	6	0.41	0.03	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.73	0.27	3.52E-01	NA	7.06E-03	1.36	
Notes					(1)(5)		(1)(5)			(6)		(7)	(8)	

Notes:

1) Shading indicates parameters which must be entered by user. Other fields are calculated automatically by the spreadsheet, and have been "locked" to prevent inadvertent modification of the equations.
2) MSW = Municipal Solid Waste.
3) Variables and equations shown in brackets are described in "Theory and Methodology of Landfill Gas Generation" (Environmental Solutions, Inc., 1993).
4) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.
5) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).
6) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.
7) LFG = Landfill Gas.
8) CH4 generation rate in volume at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

MSW LANDFILL METHANE GENERATION RATE

ENVIRONMENTAL SOLUTIONS, INC.
VERSION 93228

I) SITE INFORMATION:

Parameter	Value
Site Name	Santa Clara
Site Location	Oxnard Ca
Landfill Phase	Late Filling ('77 - '82)
Date	8/18/93
Notes	(1)

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	1,100	lb/cubic yard	(1),(2)
Exposure Time of MSW Layer in Topmost Position	1.75	years	(1),(2)
Height (thickness) of MSW Cell/Lift	15	feet	(1),(2)
Infiltration Fraction	30%	percent	(1)
Precipitation	14.5	inches/year	(1)

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole)	Carbon Atoms Per Molecule	Composition of Waste Stream (%)	Mass of Waste Component Per Unit Wet MSW (lb)	Wet Basis Moisture Content (%)	Dry Mass Per Unit MSW (lb)	Water Mass Per Unit MSW (lb)	Precipitation Mass Deposited on Unit Area (lb)	Wet Basis Moisture Content After Infiltration (%)	Total LFG Generated Per Unit MSW (moles)	CH4 Generated Per Unit MSW (cu ft/lb)	Notes
			[M]	[a]	[C]	[m = C/100]	[Ww]	[md = m * ((1-Ww)/100)]	[m' = m - md]	[mp]	[Ww*=(m'+mp)/ (md+m'+mp)]	[n = a * md * Ww* / 100 / M]	[G]	(3)
A) Pre-1995 (Prior to Implementation of AB 939):														(4)
1	Food	C6H12O6	180	6	10	0.10	70	0.03	0.07	4.04E-03	71.16	7.12E-04	0.14	
2	Paper	C6H10O5	162	6	40	0.40	6	0.38	0.02	5.06E-02	16.56	2.31E-03	0.45	
3	Vegetation	C6H10O5	162	6	18	0.18	60	0.07	0.11	9.69E-03	62.04	1.65E-03	0.32	
4	Remainder	Inorganic	NA	0	32	0.32	6	0.30	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.78	0.22	6.44E-02	NA	4.67E-03	0.90	
B) 1995 - 1999 (25 Percent Waste Reduction - AB 939):														(4)
1	Food	C6H12O6	180	6	13	0.13	70	0.04	0.09	5.25E-03	71.16	9.25E-04	0.18	
2	Paper	C6H10O5	162	6	31	0.31	6	0.29	0.02	3.92E-02	16.56	1.79E-03	0.34	
3	Vegetation	C6H10O5	162	6	16	0.16	60	0.06	0.10	8.62E-03	62.04	1.47E-03	0.28	
4	Remainder	Inorganic	NA	0	40	0.40	6	0.38	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.77	0.23	5.31E-02	NA	4.18E-03	0.81	
C) 2000, and Beyond (50 Percent Waste Reduction - AB 939):														(4)
1	Food	C6H12O6	180	6	20	0.20	70	0.06	0.14	8.08E-03	71.16	1.42E-03	0.27	
2	Paper	C6H10O5	162	6	20	0.20	6	0.19	0.01	2.53E-02	16.56	1.15E-03	0.22	
3	Vegetation	C6H10O5	162	6	16	0.16	60	0.06	0.10	8.62E-03	62.04	1.47E-03	0.28	
4	Remainder	Inorganic	NA	0	44	0.44	6	0.41	0.03	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.73	0.27	4.20E-02	NA	4.05E-03	0.78	
Notes					(1)(5)		(1)(5)			(6)		(7)	(8)	

Notes:

1) Shading indicates parameters which must be entered by user. Other fields are calculated automatically by the spreadsheet, and have been "locked" to prevent inadvertent modification of the equations.
2) MSW = Municipal Solid Waste.
3) Variables and equations shown in brackets are described in "Theory and Methodology of Landfill Gas Generation" (Environmental Solutions, Inc., 1993).
4) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.
5) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).
6) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.
7) LFG = Landfill Gas.
8) CH4 generation rate in volume at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

LANDFILL GAS GENERATION FORECAST

I) GENERAL INFORMATION:

PARAMETER	VALUE
Analysis Title	Evaluation of Current CH4 & LFG Generation Santa Clara Sanitary Landfill
Date	8/18/93
Notes	(1)

II) CONSTANTS:

PARAMETER	VALUE	UNITS	NOTES
LFG Generation Date	5/15/98	date	(1),(2)
Condensate Generation Rate	380	gal/MMCF LFG	(1),(3)

III) CALCULATIONS:

PARAMETER	UNITS	SANTA CLARA PHASE I	SANTA CLARA PHASE II	<OPEN>	<OPEN>	<OPEN>	<OPEN>	<OPEN>	<OPEN>	<OPEN>	<OPEN>	NOTES
Start of Landfilling	Date	1/1/61	7/1/77									(1)
End of Landfilling	Date	6/30/77	6/30/82									(1)
Landfilling Interval	years	16.50	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Time After Closure	years	20.89	15.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Landfilling Days/year	days	359	359									(4)
Waste Flowrate	tons per day	276	1,151									(1),(5)
Waste in Place	million tons	1.63	2.07									(1),(5)
Cumulative Waste In Place	million tons	1.63	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.70	
CH4 Per Unit MSW [G]	cu ft per lb	1.98	0.90									(1),(6)
CH4 & LFG Half-life	years	8.5	8.5									
LFG Generation Rate	scfm	201	260									(7)
CH4 Generation Rate	scfm	101	130									
Cumulative LFG Gen. Rate	scfm	201	461	461	461	461	461	461	461	461	461	
Cumulative CH4 Gen. Rate	scfm	101	231	231	231	231	231	231	231	231	231	
LFG Condensate	gallons/day	5	5	0	0	0	0	0	0	0	0	
Cumulative Condensate	gallons/day	5	9	9	9	9	9	9	9	9	9	

Notes:

1) Shading indicates parameters which must be entered by user. Other fields are calculated automatically by the spreadsheet, and have been "locked" to prevent inadvertent modification of the equations.
2) LFG = Landfill Gas.
3) Gallons condensate per million cubic feet (MMCF) of LFG reported for Puente Hills Landfill.
4) Based on VRSD records.
5) Calculation varies based on whether a total landfill volume or waste flowrate is known. Base calculation on number of days of landfill operation per year.
6) CH4 per unit MSW [G] is a "linked field" with the appropriate CH4 Generation Rate spreadsheet.
7) Calculation of LFG Generation Rate is described in "Theory and Formulation of the ESI GAS I Landfill Gas Generation Model" (Environmental Solutions, Inc., 1993).

LANDFILL GAS GENERATION FORECAST

ENVIRONMENTAL SOLUTIONS, INC.
VERSION 93228

IV) TIME SERIES ANALYSIS:

DATE	ESTIMATED LFG GENERATION RATE (SCFM)										
	SANTA CLARA PHASE I	SANTA CLARA PHASE II	<OPEN>	<OPEN>	<OPEN>	<OPEN>	<OPEN>	<OPEN>	<OPEN>	<OPEN>	TOTAL
1/1/88	469	606	0	0	0	0	0	0	0	0	1075
4/1/88	460	594	0	0	0	0	0	0	0	0	1053
7/1/88	450	582	0	0	0	0	0	0	0	0	1032
10/1/88	441	570	0	0	0	0	0	0	0	0	1011
1/1/89	432	558	0	0	0	0	0	0	0	0	991
4/1/89	424	547	0	0	0	0	0	0	0	0	971
7/1/89	415	536	0	0	0	0	0	0	0	0	951
10/1/89	407	525	0	0	0	0	0	0	0	0	932
1/1/90	398	515	0	0	0	0	0	0	0	0	913
4/1/90	390	505	0	0	0	0	0	0	0	0	895
7/1/90	383	494	0	0	0	0	0	0	0	0	877
10/1/90	375	484	0	0	0	0	0	0	0	0	859
1/1/91	367	474	0	0	0	0	0	0	0	0	842
4/1/91	360	465	0	0	0	0	0	0	0	0	825
7/1/91	353	456	0	0	0	0	0	0	0	0	808
10/1/91	345	446	0	0	0	0	0	0	0	0	792
1/1/92	338	437	0	0	0	0	0	0	0	0	776
4/1/92	332	429	0	0	0	0	0	0	0	0	760
7/1/92	325	420	0	0	0	0	0	0	0	0	745
10/1/92	318	411	0	0	0	0	0	0	0	0	730
1/1/93	312	403	0	0	0	0	0	0	0	0	715
4/1/93	306	395	0	0	0	0	0	0	0	0	701
7/1/93	300	387	0	0	0	0	0	0	0	0	687
10/1/93	293	379	0	0	0	0	0	0	0	0	673
1/1/94	287	371	0	0	0	0	0	0	0	0	659
4/1/94	282	364	0	0	0	0	0	0	0	0	646
7/1/94	276	357	0	0	0	0	0	0	0	0	633
10/1/94	270	349	0	0	0	0	0	0	0	0	620
1/1/95	265	342	0	0	0	0	0	0	0	0	607
4/1/95	260	336	0	0	0	0	0	0	0	0	595
7/1/95	254	329	0	0	0	0	0	0	0	0	583
10/1/95	249	322	0	0	0	0	0	0	0	0	571
1/1/96	244	316	0	0	0	0	0	0	0	0	560
4/1/96	239	309	0	0	0	0	0	0	0	0	549
7/1/96	234	303	0	0	0	0	0	0	0	0	537
10/1/96	230	297	0	0	0	0	0	0	0	0	527
1/1/97	225	291	0	0	0	0	0	0	0	0	516
4/1/97	221	285	0	0	0	0	0	0	0	0	506
7/1/97	216	279	0	0	0	0	0	0	0	0	495
10/1/97	212	274	0	0	0	0	0	0	0	0	485
1/1/98	207	268	0	0	0	0	0	0	0	0	475
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

TABLE B.1
SANTA CLARA LANDFILL
LFG COLLECTION DATA

DATE	LFG COLLECTED		DATE	LFG COLLECTED	
	MMBTU/MONTH	SCFM LFG		MMBTU/MONTH	SCFM LFG
2/15/88	6724	615	11/15/90	12626	578
3/15/88	10283	455	12/15/90	13539	599
4/15/88	20885	955	1/15/91	13179	583
5/15/88	19746	874	2/15/91	12097	593
6/15/88	21985	1006	3/15/91	12718	563
7/15/88	21027	931	4/15/91	5478	251
8/15/88	15332	679	5/15/91	9589	425
9/15/88	15154	693	6/15/91	12075	552
10/15/88	16096	713	7/15/91	12907	571
11/15/88	12698	581	8/15/91	11710	518
12/15/88	13378	592	9/15/91	11668	534
1/15/89	15403	682	10/15/91	11824	523
2/15/89	16681	818	11/15/91	11150	510
3/15/89	16038	710	12/15/91	12478	552
4/15/89	15608	714	1/15/92	11688	517
5/15/89	10105	447	2/15/92	12286	602
6/15/89	15238	697	3/15/92	10485	464
7/15/89	16148	715	4/15/92	9901	453
8/15/89	16130	714	5/15/92	9900	438
9/15/89	15548	711	6/15/92	11573	529
10/15/89	13243	586	7/15/92	12313	545
11/15/89	14924	683	8/15/92	12762	565
12/15/89	14658	649	9/15/92	10025	459
1/15/90	14481	641	10/15/92	10168	450
2/15/90	12375	607	11/15/92	11445	524
3/15/90	13309	589	12/15/92	12235	542
4/15/90	13386	612	1/15/93	10934	484
5/15/90	4576	203	2/15/93	10766	528
6/15/90	14406	659	3/15/93	12195	540
7/15/90	14107	625	4/15/93	11927	546
8/15/90	14318	634	5/15/93	12273	543
9/15/90	12947	592	6/15/93	10816	495
10/15/90	13916	616	7/15/93	6867	471

NOTE: Gas collection data in million BTU per month (MMBTU/Month) were converted to SCFM LFG assuming 1012 SCF methane per BTU, and 2 moles LFG per mole of methane.

APPENDIX B

EMISSIONS TABLES

Table B.1: Emissions at End of Year 1

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	4,000 tons per day	160 trips/day	32	11.41 g/mi	129	2.19 g/mi	25	2.05 g/mi	23	0.33 g/mi	4	7.81 g/mi	88	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	1 equip-shifts	NA	11.01 g/hp/hr	55	1.01 g/hp/hr	5	0.90 g/hp/hr	5	0.19 g/hp/hr	1	4.60 g/hp/hr	23	3)
Container truck engines	At LATC		4,000 tons per day	160 trips/day	1	11.41 g/mi	4	2.19 g/mi	1	2.05 g/mi	1	0.33 g/mi	0	7.81 g/mi	3	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	1 equip-shifts	NA	14.00 g/hp/hr	6	1.12 g/hp/hr	0	1.00 g/hp/hr	0	0.19 g/hp/hr	0	3.03 g/hp/hr	1	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	1 equip-shifts	2	0.63 g/mi	0	0.49 g/mi	0	0.01 g/mi	0.00	0.06 g/mi	0	5.75 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	1 equip-shifts	2	11.41 g/mi	0	2.19 g/mi	0	2.05 g/mi	0	0.33 g/mi	0	7.81 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	4000 tons per day	1 train/day	432		2066		65		43		31		203	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			86 employees	90	1.15 g/mi	20	0.29 g/mi	5	0.01 g/mi	0.17	0.06 g/mi	1.02	4.74 g/mi	81	9)
LFG generated (100%)	At MRL	in ICAPCD	MMCF/day	0.6	NA											
LFG fugitive (Escape percent =)	20%		MMCF/day	0.1	NA			27.3 lb/MMCF	3							10)
LFG flared (Collection percent =)	80%		MMCF/day	0.5	NA	0.062 lb/MMBTU	14	0.0100 lb/MMBTU	2	0.0250 lb/MMBTU	6	0.01 lb/MMBTU	3	0.0100 lb/MMBTU	2	11)
Container truck engines	35 Truck Speed (MPH)		4,000 tons per day	160 trips/day	2.51	11.41 g/mi	10	2.19 g/mi	2	2.05 g/mi	2	0.33 g/mi	0	7.81 g/mi	7	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	2	0.0357 lb/hr	3	0.0000	0	0.0000	0	0.0953 lb/hr	8	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	1 equip-shifts	NA	6.90 g/hp/hr	35	1.01 g/hp/hr	5	0.40 g/hp/hr	2	0.19 g/hp/hr	1	4.60 g/hp/hr	23	3)
D9 dozer engines	370 hp	0.8 load factor	8 hrs/equip-shift	1 equip-shifts	NA	6.90 g/hp/hr	36	0.75 g/hp/hr	4	0.40 g/hp/hr	2	0.17 g/hp/hr	1	2.15 g/hp/hr	11	3)
826C compactor engines	315 hp	0.8 load factor	8 hrs/equip-shift	1 equip-shifts	NA	6.90 g/hp/hr	31	1.76 g/hp/hr	8	0.40 g/hp/hr	2	0.17 g/hp/hr	1	7.34 g/hp/hr	33	3)
Tipper engines	165 hp	1 load factor	8 hrs/equip-shift	1 equip-shifts	NA	6.90 g/hp/hr	20	0.75 g/hp/hr	2	0.40 g/hp/hr	1	0.17 g/hp/hr	0	2.15 g/hp/hr	6	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	7 trucks	NA	6.90 g/hp/hr	153	1 g/hp/hr	22	0.40 g/hp/hr	9	0.18 g/hp/hr	4	8.50 g/hp/hr	189	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	1 equip-shifts	NA	6.90 g/hp/hr	22	1 g/hp/hr	3	0.40 g/hp/hr	1	0.18 g/hp/hr	1	8.50 g/hp/hr	27	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	6.90 g/hp/hr	151	0.36 g/hp/hr	8	0.40 g/hp/hr	9	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	6.90 g/hp/hr	154	0.97 g/hp/hr	22	0.40 g/hp/hr	9	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	1 equip-shifts	NA	14.00 g/hp/hr	6	1.12 g/hp/hr	0	1.00 g/hp/hr	0	0.19 g/hp/hr	0.1	3.03 g/hp/hr	1	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	2.51	0.63 g/mi	1	0.49 g/mi	0	0.01 g/mi	0.01	0.06 g/mi	0	5.75 g/mi	6	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	2.51	11.41 g/mi	3	2.19 g/mi	1	2.05 g/mi	1	0.33 g/mi	0	7.81 g/mi	2	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	1							14)
Fugitive dust / unpaved	BACT(%) =	95	4,000	160	0.0528					1.76	1					15)
roads / container trucks	BACT(%) =	90	tons per day	160	0.0528					0.44	0.4					16)
Fugitive dust / unpaved	BACT(%) =	95	2,610	65	0.0528					0.98	0.2					15)
roads / cover haul trucks	BACT(%) =	90	tons per day	65	0.0528					0.24	0.1					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	4,000 tons per day	160	2.51					0.13 lbs/VMT	13					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	2,610 tons per day	65	1.92					0.13 lbs/VMT	4					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	1	NA					17.52 lbs/acre/day	1					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	1	NA					0.62 lbs/acre/day	0					19)
Totals							2918		188		134		56		809	
Subtotal in SOCAB							940		55		44		16		189	20)
Subtotal in Coachella							765		24		16		12		75	20)
Subtotal in ICAPCD							1212		109		74		28		545	20)
Subtotal at Site							638		87		62		18		410	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 1996 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor. Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 1996 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 1996 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 1996 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments, linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%. NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment. EMFAC7EP emission factors for light duty trucks in 1996 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991, as publisbed in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LFG.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT. USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.

Filename: MRL 1F

Date: 15-Oct-93

Table B.2: Emissions at End of Year 1 with MSW Residue Conditioning

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	4,000 tons per day	160 trips/day	32	11.41 g/mi	129	2.19 g/mi	25	2.05 g/mi	23	0.33 g/mi	4	7.81 g/mi	88	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	1 equip-shifts	NA	11.01 g/hp/hr	55	1.01 g/hp/hr	5	0.90 g/hp/hr	5	0.19 g/hp/hr	1	4.60 g/hp/hr	23	3)
Container truck engines	At LATC		4,000 tons per day	160 trips/day	1	11.41 g/mi	4	2.19 g/mi	1	2.05 g/mi	1	0.33 g/mi	0	7.81 g/mi	3	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	1 equip-shifts	NA	14.00 g/hp/hr	6	1.12 g/hp/hr	0	1.00 g/hp/hr	0	0.19 g/hp/hr	0	3.03 g/hp/hr	1	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	1 equip-shifts	2	0.63 g/mi	0	0.49 g/mi	0	0.01 g/mi	0.00	0.06 g/mi	0	5.75 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	1 equip-shifts	2	11.41 g/mi	0	2.19 g/mi	0	2.05 g/mi	0	0.33 g/mi	0	7.81 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	4000 tons per day	1 train/day	432		2066		65		43		31		203	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			86 employees	90	1.15 g/mi	20	0.29 g/mi	5	0.01 g/mi	0.17	0 g/mi	0.00	4.74 g/mi	81	9)
LFG generated (100%)	At MRL	in ICAPCD	MMCF/day	1.3	NA											
LFG fugitive (Escape percent =)	20%		MMCF/day	0.3	NA			27.3 lb/MMCF	7							10)
LFG flared (Collection percent =)	80%		MMCF/day	1.0	NA	0.062 lb/MMBTU	31	0.0100 lb/MMBTU	5	0.0250 lb/MMBTU	13	0.01 lb/MMBTU	6	0.0100 lb/MMBTU	5	11)
Container truck engines	35 Truck Speed (MPH)		4,000 tons per day	160	2.51	11.41 g/mi	10	2.19 g/mi	2	2.05 g/mi	2	0.33 g/mi	0	7.81 g/mi	7	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	2	0.0357 lb/hr	3	0.0000	0	0.0000	0	0.0953 lb/hr	8	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	1 equip-shifts	NA	6.90 g/hp/hr	35	1.01 g/hp/hr	5	0.40 g/hp/hr	2	0.19 g/hp/hr	1	4.60 g/hp/hr	23	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	1 equip-shifts	NA	6.90 g/hp/hr	72	0.75 g/hp/hr	8	0.40 g/hp/hr	4	0.17 g/hp/hr	2	2.15 g/hp/hr	22	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	1 equip-shifts	NA	6.90 g/hp/hr	61	1.76 g/hp/hr	16	0.40 g/hp/hr	4	0.17 g/hp/hr	2	7.34 g/hp/hr	65	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	1 equip-shifts	NA	6.90 g/hp/hr	40	0.75 g/hp/hr	4	0.40 g/hp/hr	2	0.17 g/hp/hr	1	2.15 g/hp/hr	13	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	6.90 g/hp/hr	307	1 g/hp/hr	44	0.40 g/hp/hr	18	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	1 equip-shifts	NA	6.90 g/hp/hr	22	1 g/hp/hr	3	0.40 g/hp/hr	1	0.18 g/hp/hr	1	8.50 g/hp/hr	27	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	6.90 g/hp/hr	151	0.36 g/hp/hr	8	0.40 g/hp/hr	9	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	6.90 g/hp/hr	154	0.97 g/hp/hr	22	0.40 g/hp/hr	9	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	1 equip-shifts	NA	14.00 g/hp/hr	6	1.12 g/hp/hr	0	1.00 g/hp/hr	0	0.19 g/hp/hr	0.1	3.03 g/hp/hr	1	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	2.51	0.63 g/mi	1	0.49 g/mi	0	0.01 g/mi	0.01	0.06 g/mi	0	5.75 g/mi	6	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	2.51	11.41 g/mi	3	2.19 g/mi	1	2.05 g/mi	1	0.33 g/mi	0	7.81 g/mi	2	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	1							14)
Fugitive dust / unpaved	BACT(%) = 95		4,000	160	0.0528					1.76	1					15)
roads / container trucks	BACT(%) = 90		tons per day	160	0.0528					0.44	0.4					16)
Fugitive dust / unpaved	BACT(%) = 95		2,610	65	0.0528					0.98	0.2					15)
roads / cover haul trucks	BACT(%) = 90		tons per day	65	0.0528					0.24	0.1					16)
Fugitive dust / paved roads / container trucks	BACT(%) = 75		4,000 tons per day	160	2.51					0.13 lbs/VMT	13					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) = 75		2,610 tons per day	65	1.92					0.13 lbs/VMT	4					17)
Fugitive dust from landfill equipment	BACT(%) = 90		0.32 ac/dy/4000tpd	1	NA					17.52 lbs/acre/day	1					18)
Wind erosion	BACT(%) = 90		3 ac/dy/4000tpd	1	NA					0.62 lbs/acre/day	0					19)
Totals							3175		230		155		64		1051	
Subtotal in SOCAB							940		55		44		16		189	20)
Subtotal in Coachella							765		24		16		12		75	20)
Subtotal in ICAPCD							1469		152		95		36		787	20)
Subtotal at Site							895		129		83		28		651	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor. Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments, linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%. NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment. EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991, as published in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LFG.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL IFW
Date: 15-Oct-93

Table B.3: Emissions at End of Year 2

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	8,000 tons per day	320 trips/day	32	11.05 g/mi	249	2.14 g/mi	48	1.86 g/mi	42	0.32 g/mi	7	7.75 g/mi	175	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	2 equip-shifts	NA	11.01 g/hp/hr	111	1.01 g/hp/hr	10	0.90 g/hp/hr	9	0.19 g/hp/hr	2	4.60 g/hp/hr	46	3)
Container truck engines	At LATC		8,000 tons per day	320 trips/day	1	11.05 g/mi	8	2.14 g/mi	2	1.86 g/mi	1	0.32 g/mi	0	7.75 g/mi	5	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	2 equip-shifts	NA	14.00 g/hp/hr	12	1.12 g/hp/hr	0.99	1.00 g/hp/hr	0.88	0.19 g/hp/hr	0	3.03 g/hp/hr	3	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	2 equip-shifts	2	0.61 g/mi	0	0.45 g/mi	0	0.01 g/mi	0	0.06 g/mi	0	5.35 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	2 equip-shifts	2	11.05 g/mi	0	2.14 g/mi	0	1.86 g/mi	0	0.32 g/mi	0	7.75 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	8000 tons per day	2 train/day	432		4132		130		86		63		406	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			86 employees	90	1.15 g/mi	20	0.29 g/mi	5	0.01 g/mi	0.17	0 g/mi	0.00	4.74 g/mi	81	9)
LFG generated (100%)	At MRL	in ICAPCD	MMCF/day	1.7	NA											
LFG fugitive (Escape percent =)	20%		MMCF/day	0.3	NA			27.3 lb/MMCF	9							10)
LFG flared (Collection percent =)	80%		MMCF/day	1.3	NA	0.062 lb/MMBTU	41	0.0100 lb/MMBTU	7	0.0250 lb/MMBTU	17	0.01 lb/MMBTU	8	0.0100 lb/MMBTU	7	11)
Container truck engines	35 Truck Speed (MPH)		8,000 tons per day	320 trips/day	2.51	11.05 g/mi	20	2.14 g/mi	4	1.86 g/mi	3	0.32 g/mi	1	7.75 g/mi	14	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	5	0.0357 lb/hr	6	0.0000	0	0.0000	0	0.0953 lb/hr	16	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	2 equip-shifts	NA	6.90 g/hp/hr	69	1.01 g/hp/hr	10	0.40 g/hp/hr	4	0.19 g/hp/hr	2	4.60 g/hp/hr	46	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	2 equip-shifts	NA	6.90 g/hp/hr	144	0.75 g/hp/hr	16	0.40 g/hp/hr	8	0.17 g/hp/hr	4	2.15 g/hp/hr	45	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	2 equip-shifts	NA	6.90 g/hp/hr	123	1.76 g/hp/hr	31	0.40 g/hp/hr	7	0.17 g/hp/hr	3	7.34 g/hp/hr	130	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	2 equip-shifts	NA	6.90 g/hp/hr	80	0.75 g/hp/hr	9	0.40 g/hp/hr	5	0.17 g/hp/hr	2	2.15 g/hp/hr	25	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	6.90 g/hp/hr	307	1 g/hp/hr	44	0.40 g/hp/hr	18	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	2 equip-shifts	NA	6.90 g/hp/hr	44	1 g/hp/hr	6	0.40 g/hp/hr	3	0.18 g/hp/hr	1	8.50 g/hp/hr	54	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	6.90 g/hp/hr	151	0.36 g/hp/hr	8	0.40 g/hp/hr	9	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	6.90 g/hp/hr	154	0.97 g/hp/hr	22	0.40 g/hp/hr	9	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	2 equip-shifts	NA	14.00 g/hp/hr	12	1.12 g/hp/hr	1	1.00 g/hp/hr	1	0.19 g/hp/hr	0.2	3.03 g/hp/hr	3	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	2.51	0.61 g/mi	1	0.45 g/mi	0	0.01 g/mi	0	0.06 g/mi	0	5.35 g/mi	5	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	2.51	11.05 g/mi	3	2.14 g/mi	1	1.86 g/mi	0	0.32 g/mi	0	7.75 g/mi	2	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	2							14)
Fugitive dust / unpaved	BACT(%) =	95	8,000	320	0.0528					1.76	1					15)
roads / container trucks	BACT(%) =	90	tons per day	320	0.0528					0.44	0.7					16)
Fugitive dust / unpaved	BACT(%) =	95	7,430	186	0.0528					0.98	0.5					15)
roads / cover haul trucks	BACT(%) =	90	tons per day	186	0.0528					0.24	0.2					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	8,000 tons per day	320	2.51					0.13 lbs/VMT	26					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	7,430 tons per day	186	1.92					0.13 lbs/VMT	11					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	2	NA					17.52 lbs/acre/day	1					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	2	NA					0.62 lbs/acre/day	0					19)
Totals							5685		371		264		108		1535	
Subtotal in SOCAB							1872		108		84		32		376	20)
Subtotal in Coachella							1530		48		32		23		150	20)
Subtotal in ICAPCD							2282		215		148		53		1009	20)
Subtotal at Site							1153		175		125		36		819	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 1997 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor. Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 1997 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 1997 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 1997 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments, linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%. NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment. EMFAC7EP emission factors for light duty trucks in 1997 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991, as published in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LFG.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT. USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 2F
Date: 15-Oct-93

Table B.4: Emissions at End of Year 2 with MSW Residue Conditioning

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	8,000 tons per day	320 trips/day	32	11.05 g/mi	249	2.14 g/mi	48	1.86 g/mi	42	0.32 g/mi	7	7.75 g/mi	175	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	2 equip-shifts	NA	11.01 g/hp/hr	111	1.01 g/hp/hr	10	0.90 g/hp/hr	9	0.19 g/hp/hr	2	4.60 g/hp/hr	46	3)
Container truck engines	At LATC		8,000 tons per day	320 trips/day	1	11.05 g/mi	8	2.14 g/mi	2	1.86 g/mi	1	0.32 g/mi	0	7.75 g/mi	5	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	2 equip-shifts	NA	14.00 g/hp/hr	12	1.12 g/hp/hr	0.99	1.00 g/hp/hr	0.88	0.19 g/hp/hr	0.16	3.03 g/hp/hr	3	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	2 equip-shifts	2	0.61 g/mi	0	0.45 g/mi	0	0.01 g/mi	0	0.06 g/mi	0	5.35 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	2 equip-shifts	2	11.05 g/mi	0	2.14 g/mi	0	1.86 g/mi	0	0.32 g/mi	0	7.75 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	8,000 tons per day	2 train/day	432		4132		130		86		63		406	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			130 employees	90	1.12 g/mi	29	0.27 g/mi	7	0.01 g/mi	0.26	0.06 g/mi	1.55	4.44 g/mi	115	9)
LFG generated (100%)	At MRL	in ICAPCD	MMCF/day	4	NA											
LFG fugitive (Escape percent =)	20%		MMCF/day	1	NA			27.3 lb/MMCF	20							10)
LFG flared (Collection percent =)	80%		MMCF/day	3.0	NA	0.062 lb/MMBTU	92	0.0100 lb/MMBTU	15	0.0250 lb/MMBTU	37	0.01 lb/MMBTU	18	0.0100 lb/MMBTU	15	11)
Container truck engines	35 Truck Speed (MPH)		8,000 tons per day	320	2.51	11.05 g/mi	20	2.14 g/mi	4	1.86 g/mi	3	0.32 g/mi	1	7.75 g/mi	14	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	5	0.0357 lb/hr	6	0.0000	0	0.0000	0	0.0953 lb/hr	16	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	2 equip-shifts	NA	6.90 g/hp/hr	69	1.01 g/hp/hr	10	0.40 g/hp/hr	4	0.19 g/hp/hr	2	4.60 g/hp/hr	46	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	2 equip-shifts	NA	6.90 g/hp/hr	144	0.75 g/hp/hr	16	0.40 g/hp/hr	8	0.17 g/hp/hr	4	2.15 g/hp/hr	45	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	2 equip-shifts	NA	6.90 g/hp/hr	123	1.76 g/hp/hr	31	0.40 g/hp/hr	7	0.17 g/hp/hr	3	7.34 g/hp/hr	130	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	2 equip-shifts	NA	6.90 g/hp/hr	80	0.75 g/hp/hr	9	0.40 g/hp/hr	5	0.17 g/hp/hr	2	2.15 g/hp/hr	25	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	6.90 g/hp/hr	307	1 g/hp/hr	44	0.40 g/hp/hr	18	0.18 g/hp/hr	8	8.50 g/hp/hr,	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	2 equip-shifts	NA	6.90 g/hp/hr	44	1 g/hp/hr	6	0.40 g/hp/hr	3	0.18 g/hp/hr	1	8.50 g/hp/hr	54	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	6.90 g/hp/hr	151	0.36 g/hp/hr	8	0.40 g/hp/hr	9	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	6.90 g/hp/hr	154	0.97 g/hp/hr	22	0.40 g/hp/hr	9	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	2 equip-shifts	NA	14.00 g/hp/hr	12	1.12 g/hp/hr	0.99	1.00 g/hp/hr	0.88	0.19 g/hp/hr	0.16	3.03 g/hp/hr	3	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	2.51	0.61 g/mi	1	0.45 g/mi	0	0.01 g/mi	0.01	0.06 g/mi	0.06	5.35 g/mi	5	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	2.51	11.05 g/mi	3	2.14 g/mi	1	1.86 g/mi	0	0.32 g/mi	0	7.75 g/mi	2	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	2							14)
Fugitive dust / unpaved roads / container trucks	BACT(%) = 95		8,000 tons per day	320	0.0528					1.76	1					15)
	BACT(%) = 90			320	0.0528					0.44	0.7					16)
Fugitive dust / unpaved roads / cover haul trucks	BACT(%) = 95		7,430 tons per day	186	0.0528					0.98	0.5					15)
	BACT(%) = 90			186	0.0528					0.24	0.2					16)
Fugitive dust / paved roads / container trucks	BACT(%) = 75		8,000 tons per day	320	2.51					0.13 lbs/VMT	26					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) = 75		7,430 tons per day	186	1.92					0.13 lbs/VMT	11					17)
Fugitive dust from landfill equipment	BACT(%) = 90		0.32 ac/dy/4000tpd	2	NA					17.52 lbs/acre/day	1					18)
Wind erosion	BACT(%) = 90		3 ac/dy/4000tpd	2	NA					0.62 lbs/acre/day	0					19)
Totals							5744		392		285		120		1577	
Subtotal in SOCAB							1872		108		84		32		376	20)
Subtotal in Coachella							1530		48		32		23		150	20)
Subtotal in ICAPCD							2342		236		169		64		1051	20)
Subtotal at Site							1203		195		145		46		827	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 1997 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor.
Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 1997 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 1997 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 1997 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments,
linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment.
EMFAC7EP emission factors for light duty trucks in 1997 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991,
as published in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LFG.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with
road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 2FW
Date: 15-Oct-93

Table B.5: Emissions at End of Year 3

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	12,000 tons per day	480 trips/day	32	10.75 g/mi	363	2.09 g/mi	71	1.70 g/mi	58	0.32 g/mi	11	7.69 g/mi	260	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	3 equip-shifts	NA	11.01 g/hp/hr	166	1.01 g/hp/hr	15	0.90 g/hp/hr	14	0.19 g/hp/hr	3	4.60 g/hp/hr	69	3)
Container truck engines	At LATC		12,000 tons per day	480 trips/day	1	10.75 g/mi	11	2.09 g/mi	2	1.7 g/mi	2	0.32 g/mi	0	7.69 g/mi	8	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	3 equip-shifts	NA	14.00 g/hp/hr	19	1.12 g/hp/hr	1	1.00 g/hp/hr	1	0.19 g/hp/hr	0	3.03 g/hp/hr	4	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	3 equip-shifts	2	0.60 g/mi	0	0.42 g/mi	0	0.01 g/mi	0.00	0.06 g/mi	0	5.03 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	3 equip-shifts	2	10.75 g/mi	0	2.09 g/mi	0	1.7 g/mi	0	0.32 g/mi	0	7.69 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	12,000 tons per day	3 train/day	432		6198		195		129		94		609	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			183 employees	90	1.09 g/mi	40	0.25 g/mi	9	0.01 g/mi	0.36	0.06 g/mi	2.18	4.19 g/mi	152	9)
LFG generated			MMCF/day	3												
LFG fugitive (Escape percent =)	20%		MMCF/day	1				27.3 lb/MMCF	18							10)
LFG flared (Collection percent =)	80%		MMCF/day	3		0.062 lb/MMBTU	81	0.0100 lb/MMBTU	13	0.0250 lb/MMBTU	33	0.01 lb/MMBTU	16	0.0100 lb/MMBTU	13	11)
Container truck engines	35 Truck Speed (MPH)		12,000 tons per day	480	2.51	10.75 g/mi	29	2.09 g/mi	6	1.7 g/mi	5	0.32 g/mi	1	7.69 g/mi	20	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	7	0.0357 lb/hr	9	0.0000	0	0.0000	0	0.0953 lb/hr	24	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	3 equip-shifts	NA	6.90 g/hp/hr	104	1.01 g/hp/hr	15	0.40 g/hp/hr	6	0.19 g/hp/hr	3	4.60 g/hp/hr	69	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	3 equip-shifts	NA	6.90 g/hp/hr	216	0.75 g/hp/hr	23	0.40 g/hp/hr	13	0.17 g/hp/hr	5	2.15 g/hp/hr	67	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	3 equip-shifts	NA	6.90 g/hp/hr	184	1.76 g/hp/hr	47	0.40 g/hp/hr	11	0.17 g/hp/hr	5	7.34 g/hp/hr	196	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	3 equip-shifts	NA	6.90 g/hp/hr	120	0.75 g/hp/hr	13	0.40 g/hp/hr	7	0.17 g/hp/hr	3	2.15 g/hp/hr	38	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	6.90 g/hp/hr	307	1 g/hp/hr	44	0.40 g/hp/hr	18	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	3 equip-shifts	NA	6.90 g/hp/hr	66	1 g/hp/hr	10	0.40 g/hp/hr	4	0.18 g/hp/hr	2	8.50 g/hp/hr	81	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	6.90 g/hp/hr	151	0.36 g/hp/hr	8	0.40 g/hp/hr	9	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	6.90 g/hp/hr	154	0.97 g/hp/hr	22	0.40 g/hp/hr	9	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	3 equip-shifts	NA	14.00 g/hp/hr	19	1.12 g/hp/hr	1	1.00 g/hp/hr	1	0.19 g/hp/hr	0.2	3.03 g/hp/hr	4	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	2.51	0.6 g/mi	1	0.42 g/mi	0	0.01 g/mi	0.01	0.06 g/mi	0	5.03 g/mi	5	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	2.51	10.75 g/mi	3	2.09 g/mi	1	1.7 g/mi	0	0.32 g/mi	0	7.69 g/mi	2	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	2							14)
Fugitive dust / unpaved	BACT(%) = 95		12,000	480	0.0528					1.76	2					15)
roads / container trucks	BACT(%) = 90		tons per day	480	0.0528					0.44	1.1					16)
Fugitive dust / unpaved	BACT(%) = 95		4,880	122	0.0528					0.98	0.3					15)
roads / cover haul trucks	BACT(%) = 90		tons per day	122	0.0528					0.24	0.2					16)
Fugitive dust / paved roads / container trucks	BACT(%) = 75		12,000 tons per day	480 480	2.51					0.13 lbs/VMT	39					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) = 75		4,880 tons per day	122	1.92					0.13 lbs/VMT	7					17)
Fugitive dust from landfill equipment	BACT(%) = 90		0.32 ac/dy/4000tpd	3	NA					17.52 lbs/acre/day	2					18)
Wind erosion	BACT(%) = 90		3 ac/dy/4000tpd	3	NA					0.62 lbs/acre/day	1					19)
Totals							8238		527		370		160		2095	
Subtotal in SOCAB							2798		160		121		48		562	20)
Subtotal in Coachella							2296		72		48		35		226	20)
Subtotal in ICAPCD							3145		294		202		77		1307	20)
Subtotal at Site							1441		233		167		50		992	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 1998 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor.
Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 1998 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 1998 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 1998 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments,
linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment.
EMFAC7EP emission factors for light duty trucks in 1998 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991,
as published in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LFG.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with
road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 3F
Date: 15-Oct-93

Table B.6: Emissions at End of Year 3 with MSW Residue Conditioning

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	12,000 tons per day	480 trips/day	32	10.75 g/mi	363	2.09 g/mi	71	1.70 g/mi	58	0.32 g/mi	11	7.69 g/mi	260	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	3 equip-shifts	NA	11.01 g/hp/hr	166	1.01 g/hp/hr	15	0.90 g/hp/hr	14	0.19 g/hp/hr	3	4.60 g/hp/hr	69	3)
Container truck engines	At LATC		12,000 tons per day	480 trips/day	1	10.75 g/mi	11	2.09 g/mi	2	1.7 g/mi	2	0.32 g/mi	0	7.69 g/mi	8	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	3 equip-shifts	NA	14.00 g/hp/hr	19	1.12 g/hp/hr	1	1.00 g/hp/hr	1	0.19 g/hp/hr	0	3.03 g/hp/hr	4	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	3 equip-shifts	2	0.60 g/mi	0	0.42 g/mi	0	0.01 g/mi	0.00	0.06 g/mi	0.00	5.03 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	3 equip-shifts	2	10.75 g/mi	0	2.09 g/mi	0	1.7 g/mi	0	0.32 g/mi	0	7.69 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	12,000 tons per day	3 train/day	432		6198		195		129		94		609	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			175 employees	90	1.09 g/mi	38	0.25 g/mi	9	0.01 g/mi	0.35	0.06 g/mi	2.08	4.19 g/mi	145	9)
LFG generated (100%)	At MRL	in ICAPCD	MMCF/day	7	NA											
LFG fugitive (Escape percent =)	20%		MMCF/day	1	NA			27.3 lb/MMCF	39							10)
LFG flared (Collection percent =)	80%		MMCF/day	5.8	NA	0.062 lb/MMBTU	179	0.0100 lb/MMBTU	29	0.0250 lb/MMBTU	72	0.01 lb/MMBTU	35	0.0100 lb/MMBTU	29	11)
Container truck engines	35 Truck Speed (MPH)		12,000 tons per day	480	2.51	10.75 g/mi	29	2.09 g/mi	6	1.7 g/mi	5	0.32 g/mi	1	7.69 g/mi	20	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	7	0.0357 lb/hr	9	0.0000	0	0.0000	0	0.0953 lb/hr	24	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	3 equip-shifts	NA	6.90 g/hp/hr	104	1.01 g/hp/hr	15	0.40 g/hp/hr	6	0.19 g/hp/hr	3	4.60 g/hp/hr	69	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	3 equip-shifts	NA	6.90 g/hp/hr	216	0.75 g/hp/hr	23	0.40 g/hp/hr	13	0.17 g/hp/hr	5	2.15 g/hp/hr	67	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	3 equip-shifts	NA	6.90 g/hp/hr	184	1.76 g/hp/hr	47	0.40 g/hp/hr	11	0.17 g/hp/hr	5	7.34 g/hp/hr	196	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	3 equip-shifts	NA	6.90 g/hp/hr	120	0.75 g/hp/hr	13	0.40 g/hp/hr	7	0.17 g/hp/hr	3	2.15 g/hp/hr	38	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	6.90 g/hp/hr	307	1 g/hp/hr	44	0.40 g/hp/hr	18	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	3 equip-shifts	NA	6.90 g/hp/hr	66	1 g/hp/hr	10	0.40 g/hp/hr	4	0.18 g/hp/hr	2	8.50 g/hp/hr	81	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	6.90 g/hp/hr	151	0.36 g/hp/hr	8	0.40 g/hp/hr	9	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	6.90 g/hp/hr	154	0.97 g/hp/hr	22	0.40 g/hp/hr	9	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	3 equip-shifts	NA	14.00 g/hp/hr	19	1.12 g/hp/hr	1	1.00 g/hp/hr	1	0.19 g/hp/hr	0.2	3.03 g/hp/hr	4	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	2.51	0.6 g/mi	1	0.42 g/mi	0	0.01 g/mi	0.01	0.06 g/mi	0.06	5.03 g/mi	5	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	2.51	10.75 g/mi	3	2.09 g/mi	1	1.7 g/mi	0	0.32 g/mi	0	7.69 g/mi	2	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	2							14)
Fugitive dust / unpaved roads / container trucks	BACT(%) =	95	12,000 tons per day	480	0.0528					1.76	2					15)
	BACT(%) =	90		480	0.0528					0.44	1.1					16)
Fugitive dust / unpaved roads / cover haul trucks	BACT(%) =	95	4,880 tons per day	122	0.0528					0.98	0.3					15)
	BACT(%) =	90		122	0.0528					0.24	0.2					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	12,000 tons per day	480	2.51					0.13 lbs/VMT	39					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	4,880 tons per day	122	1.92					0.13 lbs/VMT	7					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	3	NA					17.52 lbs/acre/day	2					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	3	NA					0.62 lbs/acre/day	1					19)
Totals							8334		563		410		179		2104	
Subtotal in SOCAB							2798		160		121		48		562	20)
Subtotal in Coachella							2296		72		48		35		226	20)
Subtotal in ICAPCD							3241		331		241		96		1316	20)
Subtotal at Site							1539		270		206		69		1007	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 1998 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor. Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 1998 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 1998 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 1998 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments, linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%. NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment. EMFAC7EP emission factors for light duty trucks in 1998 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991, as published in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LFG.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT. USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 3FW
Date: 15-Oct-93

Table B.7: Emissions at End of Year 5

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	12,000 tons per day	480 trips/day	32	10.31 g/mi	348	2.02 g/mi	68	1.45 g/mi	49	0.31 g/mi	10	7.60 g/mi	257	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	3 equip-shifts	NA	11.01 g/hp/hr	166	1.01 g/hp/hr	15	0.90 g/hp/hr	14	0.19 g/hp/hr	3	4.60 g/hp/hr	69	3)
Container truck engines	At LATC		12,000 tons per day	480 trips/day	1	10.31 g/mi	11	2.02 g/mi	2	1.45 g/mi	2	0.31 g/mi	0	7.6 g/mi	8	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	3 equip-shifts	NA	14.00 g/hp/hr	19	1.12 g/hp/hr	1	1.00 g/hp/hr	1	0.19 g/hp/hr	0	3.03 g/hp/hr	4	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shif	3 equip-shifts	2	0.56 g/mi	0	0.36 g/mi	0	0.01 g/mi	0	0.06 g/mi	0	4.39 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shif	3 equip-shifts	2	10.31 g/mi	0	2.02 g/mi	0	1.45 g/mi	0	0.31 g/mi	0	7.6 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	12,000 tons per day	3 train/day	432		6198		195		129		94		609	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			175 employees	90	1.02 g/mi	35	0.22 g/mi	8	0.01 g/mi	0.35	0.06 g/mi	2.08	3.69 g/mi	128	9)
LFG generated (100%)	At MRL	in ICAPCD	MMCF/day	6	NA											
LFG fugitive (Escape percent =)	20%		MMCF/day	1	NA			27.3 lb/MMCF	34							10)
LFG flared (Collection percent =)	80%		MMCF/day	5	NA	0.062 lb/MMBTU	155	0.0100 lb/MMBTU	25	0.0250 lb/MMBTU	63	0.01 lb/MMBTU	30	0.0100 lb/MMBTU	25	11)
Container truck engines	35 Truck Speed (MPH)		12,000 tons per day	480 trips/day	2.51	10.31 g/mi	27	2.02 g/mi	5	1.45 g/mi	4	0.31 g/mi	1	7.6 g/mi	20	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	7	0.0357 lb/hr	9	0.0000	0	0.0000	0	0.0953 lb/hr	24	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	3 equip-shifts	NA	5.80 g/hp/hr	87	1.01 g/hp/hr	15	0.16 g/hp/hr	2	0.19 g/hp/hr	3	4.60 g/hp/hr	69	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	3 equip-shifts	NA	5.80 g/hp/hr	182	0.75 g/hp/hr	23	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	67	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	3 equip-shifts	NA	5.80 g/hp/hr	155	1.76 g/hp/hr	47	0.16 g/hp/hr	4	0.17 g/hp/hr	5	7.34 g/hp/hr	196	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	3 equip-shifts	NA	5.80 g/hp/hr	101	0.75 g/hp/hr	13	0.16 g/hp/hr	3	0.17 g/hp/hr	3	2.15 g/hp/hr	38	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	3 equip-shifts	NA	5.80 g/hp/hr	55	1 g/hp/hr	10	0.16 g/hp/hr	2	0.18 g/hp/hr	2	8.50 g/hp/hr	81	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	3 equip-shifts	NA	14.00 g/hp/hr	19	1.12 g/hp/hr	1.48	1.00 g/hp/hr	1.32	0.19 g/hp/hr	0.25	3.03 g/hp/hr	4	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shif	30 trucks	2.51	0.56 g/mi	1	0.36 g/mi	0	0.01 g/mi	0	0.06 g/mi	0	4.39 g/mi	4	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shif	16 trucks	2.51	10.31 g/mi	3	2.02 g/mi	1	1.45 g/mi	0	0.31 g/mi	0	7.6 g/mi	2	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	2							14)
Fugitive dust / unpaved roads / container trucks	BACT(%) = 95		12,000 tons per day	480	0.0528					1.76	2					15)
	BACT(%) = 90			480	0.0528					0.44	1.1					16)
Fugitive dust / unpaved roads / cover haul trucks	BACT(%) = 95		1,800 tons per day	45	0.0528					0.98	0.1					15)
	BACT(%) = 90			45	0.0528					0.24	0.1					16)
Fugitive dust / paved roads / container trucks	BACT(%) = 75		12,000 tons per day	480	2.51					0.13 lbs/VMT	39					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) = 75		1,800 tons per day	45	1.92					0.13 lbs/VMT	3					17)
Fugitive dust from landfill equipment	BACT(%) = 90		0.32 ac/dy/4000tpd	3	NA					17.52 lbs/acre/day	2					18)
Wind erosion	BACT(%) = 90		3 ac/dy/4000tpd	3	NA					0.62 lbs/acre/day	1					19)
Totals							8084		551		340		174		2079	
Subtotal in SOCAB							2783		158		112		48		559	20)
Subtotal in Coachella							2296		72		48		35		226	20)
Subtotal in ICAPCD							3006		321		180		92		1294	20)
Subtotal at Site							1306		261		145		64		1003	

Notes:

NA = Not applicable

1) CARB, 1991, EMFAC7EP at 75F for 2000 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L

2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.

3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor. Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.

4) CARB, 1991, EMFAC7EP at 75F for 2000 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-I

5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.

6) EMFAC7EP emission factors for light duty trucks in 2000 at 75F and 35mph (CARB run 1/24/1991.

7) EMFAC7EP emission factors for medium duty trucks in 2000 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.

8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments, linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%. NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).

9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment. EMFAC7EP emission factors for light duty trucks in 2000 at 75F and 55mph (CARB run 1/24/1991.)

10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991, as published in the Draft EIR for Puente Hill, May 1992.

11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LF(

12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).

13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.

14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.

15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.

16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.

17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with road surf loading set to 20 lb/mi.

18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.

19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT. USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.

20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.

Filename: MRL 5F

Date: 15-Oct-93

Table B.8: Emissions at End of Year 5 with MSW Residue Conditioning

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	12,000 tons per day	480 trips/day	32	10.31 g/mi	348	2.02 g/mi	68	1.45 g/mi	49	0.31 g/mi	10	7.60 g/mi	257	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	3 equip-shifts	NA	11.01 g/hp/hr	166	1.01 g/hp/hr	15	0.90 g/hp/hr	14	0.19 g/hp/hr	3	4.60 g/hp/hr	69	3)
Container truck engines	At LATC		12,000 tons per day	480 trips/day	1	10.31 g/mi	11	2.02 g/mi	2	1.45 g/mi	2	0.31 g/mi	0	7.6 g/mi	8	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	3 equip-shifts	NA	14.00 g/hp/hr	19	1.12 g/hp/hr	1	1.00 g/hp/hr	1	0.19 g/hp/hr	0	3.03 g/hp/hr	4	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	3 equip-shifts	2	0.56 g/mi	0	0.36 g/mi	0	0.01 g/mi	0	0.06 g/mi	0	4.39 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	3 equip-shifts	2	10.31 g/mi	0	2.02 g/mi	0	1.45 g/mi	0	0.31 g/mi	0	7.6 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	12,000 tons per day	3 train/day	432		6198		195		129		94		609	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			175 employees	90	1.02 g/mi	35	0.22 g/mi	8	0.01 g/mi	0.35	0.06 g/mi	2.08	3.69 g/mi	128	9)
LFG generated (100%)	At MRL	In ICAPCD	MMCF/day	13	NA											
LFG fugitive (Escape percent =)	20%		MMCF/day	3	NA			27.3 lb/MMCF	72							10)
LFG flared (Collection percent =)	80%		MMCF/day	10.6	NA	0.062 lb/MMBTU	328	0.0100 lb/MMBTU	53	0.0250 lb/MMBTU	132	0.01 lb/MMBTU	64	0.0100 lb/MMBTU	53	11)
Container truck engines	35 Truck Speed (MPH)		12,000 tons per day	480	2.51	10.31 g/mi	27	2.02 g/mi	5	1.45 g/mi	4	0.31 g/mi	1	7.6 g/mi	20	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	7	0.0357 lb/hr	9	0.0000	0	0.0000	0	0.0953 lb/hr	24	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	3 equip-shifts	NA	5.80 g/hp/hr	87	1.01 g/hp/hr	15	0.16 g/hp/hr	2	0.19 g/hp/hr	3	4.60 g/hp/hr	69	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	3 equip-shifts	NA	5.80 g/hp/hr	182	0.75 g/hp/hr	23	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	67	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	3 equip-shifts	NA	5.80 g/hp/hr	155	1.76 g/hp/hr	47	0.16 g/hp/hr	4	0.17 g/hp/hr	5	7.34 g/hp/hr	196	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	3 equip-shifts	NA	5.80 g/hp/hr	101	0.75 g/hp/hr	13	0.16 g/hp/hr	3	0.17 g/hp/hr	3	2.15 g/hp/hr	38	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	3 equip-shifts	NA	5.80 g/hp/hr	55	1 g/hp/hr	10	0.16 g/hp/hr	2	0.18 g/hp/hr	2	8.50 g/hp/hr	81	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	3 equip-shifts	NA	14.00 g/hp/hr	19	1.12 g/hp/hr	1.48	1.00 g/hp/hr	1.32	0.19 g/hp/hr	0.25	3.03 g/hp/hr	4	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	2.51	0.56 g/mi	1	0.36 g/mi	0	0.01 g/mi	0	0.06 g/mi	0	4.39 g/mi	4	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	2.51	10.31 g/mi	3	2.02 g/mi	1	1.45 g/mi	0	0.31 g/mi	0	7.6 g/mi	2	7)
Fueling area evaporation			NA	NA	NA			0.82 lb/dy/4000tpd	2							14)
Fugitive dust / unpaved	BACT(%) =	95	12,000	480	0.0528					1.76	2					15)
roads / container trucks	BACT(%) =	90	tons per day	480	0.0528					0.44	1.1					16)
Fugitive dust / unpaved	BACT(%) =	95	1,800	45	0.0528					0.98	0.1					15)
roads / cover haul trucks	BACT(%) =	90	tons per day	45	0.0528					0.24	0.1					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	12,000 tons per day	480	2.51					0.13 lbs/VMT	39					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	1,800 tons per day	45	1.92					0.13 lbs/VMT	3					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	3	NA					17.52 lbs/acre/day	2					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	3	NA					0.62 lbs/acre/day	1					19)
Totals							8257		617		410		208		2107	
Subtotal in SOCAB							2783		158		112		48		559	20)
Subtotal in Coachella							2296		72		48		35		226	20)
Subtotal in ICAPCD							3179		387		250		125		1322	20)
Subtotal at Site							1479		327		215		98		1030	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2000 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor.
Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2000 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2000 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2000 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments,
linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment.
EMFAC7EP emission factors for light duty trucks in 2000 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991,
as published in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LFG.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with
road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 5FW
Date: 15-Oct-93

Table B.9: Emissions at End of Year 7

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	16,000 tons per day	640 trips/day	32	10.03 g/mi	452	1.97 g/mi	89	1.30 g/mi	59	0.3 g/mi	14	7.54 g/mi	340	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	4 equip-shifts	NA	11.01 g/hp/hr	221	1.01 g/hp/hr	20	0.90 g/hp/hr	18	0.19 g/hp/hr	4	4.60 g/hp/hr	92	3)
Container truck engines	At LATC		16,000 tons per day	640 trips/day	1	10.03 g/mi	14	1.97 g/mi	3	1.3 g/mi	2	0.30 g/mi	0	7.54 g/mi	11	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	4 equip-shifts	NA	14.00 g/hp/hr	25	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0	3.03 g/hp/hr	5	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	4 equip-shifts	2	0.51 g/mi	0	0.29 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	3.68 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	4 equip-shifts	2	10.03 g/mi	1	1.97 g/mi	0	1.3 g/mi	0	0.3 g/mi	0	7.54 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	16,000 tons per day	4 train/day	432		8264		260		172		126		812	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL		NA	220 employees	90	0.93 g/mi	41	0.18 g/mi	8	0.01 g/mi	0.44	0.05 g/mi	2.18	3.13 g/mi	137	9)
LFG generated (100%)	At MRL	in ICAPCD	MMCF/day	10	NA											
LFG fugitive (Escape percent =)	20%		MMCF/day	2	NA			27.3 lb/MMCF	52							10)
LFG flared (Collection percent =)	80%		MMCF/day	8	NA	0.062 lb/MMBTU	237	0.0100 lb/MMBTU	38	0.0250 lb/MMBTU	96	0.01 lb/MMBTU	46	0.0100 lb/MMBTU	38	11)
Container truck engines	35 Truck Speed (MPH)		16,000 tons per day	640 trips/day	2.51	10.03 g/mi	36	1.97 g/mi	7	1.3 g/mi	5	0.3 g/mi	1	7.54 g/mi	27	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	10	0.0357 lb/hr	12	0.0000	0	0.0000	0	0.0953 lb/hr	32	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	4 equip-shifts	NA	5.80 g/hp/hr	117	1.01 g/hp/hr	20	0.16 g/hp/hr	3	0.19 g/hp/hr	4	4.60 g/hp/hr	92	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	4 equip-shifts	NA	5.80 g/hp/hr	242	0.75 g/hp/hr	31	0.16 g/hp/hr	7	0.17 g/hp/hr	7	2.15 g/hp/hr	90	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	4 equip-shifts	NA	5.80 g/hp/hr	206	1.76 g/hp/hr	63	0.16 g/hp/hr	6	0.17 g/hp/hr	6	7.34 g/hp/hr	261	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	4 equip-shifts	NA	5.80 g/hp/hr	135	0.75 g/hp/hr	17	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.15 g/hp/hr	50	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	4 equip-shifts	NA	5.80 g/hp/hr	74	1 g/hp/hr	13	0.16 g/hp/hr	2	0.18 g/hp/hr	2	8.50 g/hp/hr	108	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	4 equip-shifts	NA	14.00 g/hp/hr	25	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.3	3.03 g/hp/hr	5	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	2.51	0.51 g/mi	1	0.29 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	3.68 g/mi	4	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	2.51	10.03 g/mi	3	1.97 g/mi	1	1.3 g/mi	0	0.3 g/mi	0	7.54 g/mi	2	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	3							14)
Fugitive dust / unpaved roads / container trucks	BACT(%) =	95	16,000 tons per day	640	0.0528					1.76	3					15)
	BACT(%) =	90		640	0.0528					0.44	1.5					16)
Fugitive dust / unpaved roads / cover haul trucks	BACT(%) =	95	12,640 tons per day	316	0.0528					0.98	0.8					15)
	BACT(%) =	90		316	0.0528					0.24	0.4					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	16,000 tons per day	640	2.51					0.13 lbs/VMT	51					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	12,640 tons per day	316	1.92					0.13 lbs/VMT	19					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	4	NA					17.52 lbs/acre/day	2					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	4	NA					0.62 lbs/acre/day	1					19)
Totals							10616		716		470		232		2579	
Subtotal in SOCAB							3697		208		143		63		742	20)
Subtotal in Coachella							3061		96		64		47		301	20)
Subtotal in ICAPCD							3858		412		264		122		1536	20)
Subtotal at Site							1598		334		217		86		1181	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2002 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor. Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2002 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2002 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2002 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments, linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%. NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment. EMFAC7EP emission factors for light duty trucks in 2002 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991, as published in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LFG.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 7F
Date: 15-Oct-93

Table B.10: Emissions at End of Year 7 with MSW Residue Conditioning

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	16,000 tons per day	640 trips/day	32	10.03 g/mi	452	1.97 g/mi	89	1.30 g/mi	59	0.3 g/mi	14	7.54 g/mi	340	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	4 equip-shifts	NA	11.01 g/hp/hr	221	1.01 g/hp/hr	20	0.90 g/hp/hr	18	0.19 g/hp/hr	4	4.60 g/hp/hr	92	3)
Container truck engines	At LATC		16,000 tons per day	640 trips/day	1	10.03 g/mi	14	1.97 g/mi	3	1.3 g/mi	2	0.30 g/mi	0	7.54 g/mi	11	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	4 equip-shifts	NA	14.00 g/hp/hr	25	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0	3.03 g/hp/hr	5	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	4 equip-shifts	2	0.51 g/mi	0	0.29 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	3.68 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	4 equip-shifts	2	10.03 g/mi	1	1.97 g/mi	0	1.3 g/mi	0	0.3 g/mi	0	7.54 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	16,000 tons per day	4 train/day	432		8264		260		172		126		812	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			220 employees	90	0.93 g/mi	41	0.18 g/mi	8	0.01 g/mi	0.44	0.05 g/mi	2.18	3.13 g/mi	137	9)
LFG generated (100%)	At MRL	in ICAPCD	MMCF/day	19	NA											
LFG fugitive (Escape percent =)	20%		MMCF/day	4	NA			27.3 lb/MMCF	105							10)
LFG flared (Collection percent =)	80%		MMCF/day	15.4	NA	0.062 lb/MMBTU	477	0.0100 lb/MMBTU	77	0.0250 lb/MMBTU	192	0.01 lb/MMBTU	92	0.0100 lb/MMBTU	77	11)
Container truck engines	35 Truck Speed (MPH)		16,000 tons per day	640	2.51	10.03 g/mi	36	1.97 g/mi	7	1.3 g/mi	5	0.3 g/mi	1	7.54 g/mi	27	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	10	0.0357 lb/hr	12	0.0000	0	0.0000	0	0.0953 lb/hr	32	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	4 equip-shifts	NA	5.80 g/hp/hr	117	1.01 g/hp/hr	20	0.16 g/hp/hr	3	0.19 g/hp/hr	4	4.60 g/hp/hr	92	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	4 equip-shifts	NA	5.80 g/hp/hr	242	0.75 g/hp/hr	31	0.16 g/hp/hr	7	0.17 g/hp/hr	7	2.15 g/hp/hr	90	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	4 equip-shifts	NA	5.80 g/hp/hr	206	1.76 g/hp/hr	63	0.16 g/hp/hr	6	0.17 g/hp/hr	6	7.34 g/hp/hr	261	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	4 equip-shifts	NA	5.80 g/hp/hr	135	0.75 g/hp/hr	17	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.15 g/hp/hr	50	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	4 equip-shifts	NA	5.80 g/hp/hr	74	1 g/hp/hr	13	0.16 g/hp/hr	2	0.18 g/hp/hr	2	8.50 g/hp/hr	108	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	4 equip-shifts	NA	14.00 g/hp/hr	25	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.3	3.03 g/hp/hr	5	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	2.51	0.51 g/mi	1	0.29 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	3.68 g/mi	4	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	2.51	10.03 g/mi	3	1.97 g/mi	1	1.3 g/mi	0	0.3 g/mi	0	7.54 g/mi	2	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	3							14)
Fugitive dust / unpaved	BACT(%) = 95		16,000	640	0.0528					1.76	3					15)
roads / container trucks	BACT(%) = 90		tons per day	640	0.0528					0.44	1.5					16)
Fugitive dust / unpaved	BACT(%) = 95		12,640	316	0.0528					0.98	0.8					15)
roads / cover haul trucks	BACT(%) = 90		tons per day	316	0.0528					0.24	0.4					16)
Fugitive dust / paved roads / container trucks	BACT(%) = 75		16,000 tons per day	640	2.51					0.13 lbs/VMT	51					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) = 75		12,640 tons per day	316	1.92					0.13 lbs/VMT	19					17)
Fugitive dust from landfill equipment	BACT(%) = 90		0.32 ac/dy/4000tpd	4	NA					17.52 lbs/acre/day	2					18)
Wind erosion	BACT(%) = 90		3 ac/dy/4000tpd	4	NA					0.62 lbs/acre/day	1					19)
Totals							10855		807		567		278		2618	
Subtotal in SOCAB							3697		208		143		63		742	20)
Subtotal in Coachella							3061		96		64		47		301	20)
Subtotal in ICAPCD							4098		503		361		168		1575	20)
Subtotal at Site							1838		425		314		133		1220	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2002 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor.
Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2002 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2002 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2002 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments,
linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment.
EMFAC7EP emission factors for light duty trucks in 2002 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991,
as published in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LFG.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with
road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 7FW
Date: 15-Oct-93

Table B.11: Emissions at End of Year 8

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	20,000 tons per day	800 trips/day	32	9.94 g/mi	560	1.95 g/mi	110	1.24 g/mi	70	0.3 g/mi	17	7.52 g/mi	424	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	5 equip-shifts	NA	11.01 g/hp/hr	277	1.01 g/hp/hr	25	0.90 g/hp/hr	23	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
Container truck engines	At LATC		20,000 tons per day	800 trips/day	1	9.94 g/mi	18	1.95 g/mi	3	1.24 g/mi	2	0.30 g/mi	1	7.52 g/mi	13	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	5 equip-shifts	2	0.48 g/mi	0	0.26 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	3.38 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	5 equip-shifts	2	9.94 g/mi	1	1.95 g/mi	0	1.24 g/mi	0	0.3 g/mi	0	7.52 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	20,000 tons per day	5 train/day	432		7231		325		215		157		1015	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL		NA	268 employees	90	0.88 g/mi	47	0.16 g/mi	9	0.01 g/mi	0.53	0.05 g/mi	2.66	2.89 g/mi	154	9)
LFG generated (100%)	At MRL	in ICAPCD	MMCF/day	12	NA											
LFG fugitive (Escape percent =)	20%		MMCF/day	2	NA			27.3 lb/MMCF	66							10)
LFG flared (Collection percent =)	80%		MMCF/day	10	NA	0.062 lb/MMBTU	301	0.0100 lb/MMBTU	49	0.0250 lb/MMBTU	121	0.01 lb/MMBTU	58	0.0100 lb/MMBTU	49	11)
Container truck engines	35 Truck Speed (MPH)		20,000 tons per day	800 trips/day	2.51	9.94 g/mi	44	1.95 g/mi	9	1.24 g/mi	5	0.3 g/mi	1	7.52 g/mi	33	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	12	0.0357 lb/hr	15	0.0000	0	0.0000	0	0.0953 lb/hr	40	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	146	1.01 g/hp/hr	25	0.16 g/hp/hr	4	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	303	0.75 g/hp/hr	39	0.16 g/hp/hr	8	0.17 g/hp/hr	9	2.15 g/hp/hr	112	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	258	1.76 g/hp/hr	78	0.16 g/hp/hr	7	0.17 g/hp/hr	8	7.34 g/hp/hr	326	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	169	0.75 g/hp/hr	22	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	63	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	92	1 g/hp/hr	16	0.16 g/hp/hr	3	0.18 g/hp/hr	3	8.50 g/hp/hr	135	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.4	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	2.51	0.48 g/mi	0	0.26 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	3.38 g/mi	3	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	2.51	9.94 g/mi	3	1.95 g/mi	1	1.24 g/mi	0	0.3 g/mi	0	7.52 g/mi	2	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	4							14)
Fugitive dust / unpaved roads / container trucks	BACT(%) =	95	20,000 tons per day	800	0.0528					1.76	4					15)
	BACT(%) =	90		800	0.0528					0.44	1.9					16)
Fugitive dust / unpaved roads / cover haul trucks	BACT(%) =	95	4,620 tons per day	116	0.0528					0.98	0.3					15)
	BACT(%) =	90		116	0.0528					0.24	0.1					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	20,000 tons per day	800	2.51					0.13 lbs/VMT	64					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	4,620 tons per day	116	1.92					0.13 lbs/VMT	7					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	5	NA					17.52 lbs/acre/day	3					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	5	NA					0.62 lbs/acre/day	1					19)
Totals							10036		875		564		287		3086	
Subtotal in SOCAB							3497		259		175		79		927	20)
Subtotal in Coachella							2678		120		80		58		376	20)
Subtotal in ICAPCD							3861		496		309		149		1784	20)
Subtotal at Site							1872		400		251		105		1358	

Notes:
NA = Not applicable

1) CARB, 1991, EMFAC7EP at 75F for 2003 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor. Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2002 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2003 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2003 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments, linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%. NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment. EMFAC7EP emission factors for light duty trucks in 2003 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991, as published in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LFG.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol 1: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT. USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.

Filename: MRL 8F
Date: 15-Oct-93

Table B.12: Emissions at End of Year 8 with MSW Residue Conditioning

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	20,000 tons per day	800 trips/day	32	9.94 g/mi	560	1.95 g/mi	110	1.24 g/mi	70	0.3 g/mi	17	7.52 g/mi	424	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	5 equip-shifts	NA	11.01 g/hp/hr	277	1.01 g/hp/hr	25	0.90 g/hp/hr	23	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
Container truck engines	At LATC		20,000 tons per day	800 trips/day	1	9.94 g/mi	18	1.95 g/mi	3	1.24 g/mi	2	0.30 g/mi	1	7.52 g/mi	13	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	5 equip-shifts	2	0.48 g/mi	0	0.26 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	3.38 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	5 equip-shifts	2	9.94 g/mi	1	1.95 g/mi	0	1.24 g/mi	0	0.3 g/mi	0	7.52 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	20,000 tons per day	5 train/day	432		7231		325		215		157		1015	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL		NA	268 employees	90	0.88 g/mi	47	0.16 g/mi	9	0.01 g/mi	0.53	0.05 g/mi	2.66	2.89 g/mi	154	9)
LFG generated (100%)			MMCF/day	24	NA											
LFG fugitive (Escape percent =)	20%	Air in ICAPCD	MMCF/day	5	NA			27.3 lb/MMCF	129							10)
LFG flared (Collection percent =)	80%		MMCF/day	18.9	NA	0.062 lb/MMBTU	586	0.0100 lb/MMBTU	94	0.0250 lb/MMBTU	236	0.01 lb/MMBTU	113	0.0100 lb/MMBTU	94	11)
Container truck engines	35 Truck Speed (MPH)		20,000 tons per day	800	2.51	9.94 g/mi	44	1.95 g/mi	9	1.24 g/mi	5	0.3 g/mi	1	7.52 g/mi	33	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	12	0.0357 lb/hr	15	0.0000	0	0.0000	0	0.0953 lb/hr	40	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	146	1.01 g/hp/hr	25	0.16 g/hp/hr	4	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	303	0.75 g/hp/hr	39	0.16 g/hp/hr	8	0.17 g/hp/hr	9	2.15 g/hp/hr	112	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	258	1.76 g/hp/hr	78	0.16 g/hp/hr	7	0.17 g/hp/hr	8	7.34 g/hp/hr	326	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	169	0.75 g/hp/hr	22	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	63	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	92	1 g/hp/hr	16	0.16 g/hp/hr	3	0.18 g/hp/hr	3	8.50 g/hp/hr	135	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.4	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines		Air in ICAPCD	6 trips/equip-shift	30 trucks	2.51	0.48 g/mi	0	0.26 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	3.38 g/mi	3	6)
Medium/heavy-duty truck (diesel) engines		Air in ICAPCD	3 trips/equip-shift	16 trucks	2.51	9.94 g/mi	3	1.95 g/mi	1	1.24 g/mi	0	0.3 g/mi	0	7.52 g/mi	2	7)
Fueling area evaporation		Air in ICAPCD	NA	NA	NA			0.82 lb/dy/4000tpd	4							14)
Fugitive dust / unpaved	BACT(%) = 95		20,000	800	0.0528					1.76	4					15)
roads / container trucks	BACT(%) = 90		tons per day	800	0.0528					0.44	1.9					16)
Fugitive dust / unpaved	BACT(%) = 95		4,620	116	0.0528					0.98	0.3					15)
roads / cover haul trucks	BACT(%) = 90		tons per day	116	0.0528					0.24	0.1					16)
Fugitive dust / paved roads / container trucks	BACT(%) = 75	Air in ICAPCD	20,000 tons per day	800	2.51					0.13 lbs/VMT	64					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) = 75	Air in ICAPCD	4,620 tons per day	116	1.92					0.13 lbs/VMT	7					17)
Fugitive dust from landfill equipment	BACT(%) = 90	Air in ICAPCD	0.32 ac/dy/4000tpd	5	NA					17.52 lbs/acre/day	3					18)
Wind erosion	BACT(%) = 90	Air in ICAPCD	3 ac/dy/4000tpd	5	NA					0.62 lbs/acre/day	1					19)
Totals							10321		984		679		342		3132	
Subtotal in SOCAB							3497		259		175		79		927	20)
Subtotal in Coachella							2678		120		80		58		376	20)
Subtotal in ICAPCD							4146		605		424		204		1830	20)
Subtotal at Site							2157		509		366		160		1404	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2003 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor. Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2003 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2003 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2003 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments, linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%. NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment. EMFAC7EP emission factors for light duty trucks in 2003 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991, as published in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LFG.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT. USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 8FW
Date: 15-Oct-93

Table B.13: Emissions at End of Year 10

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	20,000 tons per day	800 trips/day	32	9.81 g/mi	553	1.93 g/mi	109	1.16 g/mi	65	0.3 g/mi	17	7.47 g/mi	421	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	5 equip-shifts	NA	11.01 g/hp/hr	277	1.01 g/hp/hr	25	0.90 g/hp/hr	23	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
Container truck engines	At LATC		20,000 tons per day	800 trips/day	1	9.81 g/mi	17	1.93 g/mi	3	1.16 g/mi	2	0.30 g/mi	1	7.47 g/mi	13	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	5 equip-shifts	2	0.43 g/mi	0	0.20 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.90 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	5 equip-shifts	2	9.81 g/mu	1	1.93 g/mi	0	1.16 g/mi	0	0.3 g/mi	0	7.47 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	20,000 tons per day	5 train/day	432		7231		325		215		157		1015	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			268 employees	90	0.79 g/mi	42	0.13 g/mi	7	0.01 g/mi	0.53	0.05 g/mi	2.66	2.50 g/mi	133	9)
LFG generated (100%)	At MRL	in ICAPCD	MMCF/day	17	NA											
LFG fugitive (Escape percent =)	20%		MMCF/day	3	NA			27.3 lb/MMCF	91							10)
LFG flared (Collection percent =)	80%		MMCF/day	13	NA	0.062 lb/MMBTU	415	0.01 lb/MMBTU	67	0.025 lb/MMBTU	167	0.01 lb/MMBTU	80	0.01 lb/MMBTU	67	11)
Container truck engines	35 Truck Speed (MPH)		20,000 tons per day	800 trips/day	2.51	9.81 g/mi	43	1.93 g/mi	9	1.16 g/mi	5	0.3 g/mi	1	7.47 g/mi	33	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	12	0.0357 lb/hr	15	0	0	0	0	0.0953 lb/hr	40	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	146	1.01 g/hp/hr	25	0.16 g/hp/hr	4	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	303	0.75 g/hp/hr	39	0.16 g/hp/hr	8	0.17 g/hp/hr	9	2.15 g/hp/hr	112	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	258	1.76 g/hp/hr	78	0.16 g/hp/hr	7	0.17 g/hp/hr	8	7.34 g/hp/hr	326	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	169	0.75 g/hp/hr	22	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	63	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	92	1 g/hp/hr	16	0.16 g/hp/hr	3	0.18 g/hp/hr	3	8.50 g/hp/hr	135	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.4	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	2.51	0.43 g/mi	0	0.2 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.9 g/mi	3	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	2.51	9.81 g/mi	3	1.93 g/mi	1	1.16 g/mi	0	0.3 g/mi	0	7.47 g/mi	2	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	4							14)
Fugitive dust / unpaved	BACT(%) =	95	20,000	800	0.0528					1.76	4					15)
roads / container trucks	BACT(%) =	90	tons per day	800	0.0528					0.44	1.9					16)
Fugitive dust / unpaved	BACT(%) =	95	7,690	192	0.0528					0.98	0.5					15)
roads / cover haul trucks	BACT(%) =	90	tons per day	192	0.0528					0.24	0.2					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	20,000 tons per day	800	2.51					0.13 lbs/VMT	64					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	7,690 tons per day	192	1.92					0.13 lbs/VMT	12					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	5	NA					17.52 lbs/acre/day	3					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	5	NA					0.62 lbs/acre/day	1					19)
Totals							10137		916		610		309		3080	
Subtotal in SOCAB							3489		257		170		79		924	20)
Subtotal in Coachella							2678		120		80		58		376	20)
Subtotal in ICAPCD							3969		538		360		171		1781	20)
Subtotal at Site							1986		444		302		127		1375	

Page 1 of 2

Notes:
NA = Not applicable

1) CARB, 1991, EMFAC7EP at 75F for 2005 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor. Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2005 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2005 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2005 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments, linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment.
EMFAC7EP emission factors for light duty trucks in 2005 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991, as published in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LFG.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.

Filename: MRL 10F
Date: 16-Oct-93

Table B.14: Emissions at End of Year 10 with MSW Residue Conditioning

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	20,000 tons per day	800 trips/day	32	9.81 g/mi	553	1.93 g/mi	109	1.16 g/mi	65	0.3 g/mi	17	7.47 g/mi	421	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	5 equip-shifts	NA	11.01 g/hp/hr	277	1.01 g/hp/hr	25	0.90 g/hp/hr	23	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
Container truck engines	At LATC		20,000 tons per day	800 trips/day	1	9.81 g/mi	17	1.93 g/mi	3	1.16 g/mi	2	0.30 g/mi	1	7.47 g/mi	13	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	5 equip-shifts	2	0.43 g/mi	0	0.20 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.90 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	5 equip-shifts	2	9.81 g/mi	1	1.93 g/mi	0	1.16 g/mi	0	0.3 g/mi	0	7.47 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	20,000 tons per day	5 train/day	432		7231		325		215		157		1015	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			268 employees	90	0.79 g/mi	42	0.13 g/mi	7	0.01 g/mi	0.53	0.05 g/mi	2.66	2.50 g/mi	133	9)
LFG generated (100%)	At MRL	in ICAPCD	MMCF/day	32	NA											
LFG fugitive (Escape percent =)	20%	Air in ICAPCD	MMCF/day	6	NA			27.3 lb/MMCF	172							10)
LFG flared (Collection percent =)	80%		MMCF/day	25	NA	0.062 lb/MMBTU	781	0.0100 lb/MMBTU	126	0.0250 lb/MMBTU	315	0.01 lb/MMBTU	151	0.0100 lb/MMBTU	126	11)
Container truck engines	35 Truck Speed (MPH)		20,000 tons per day	800	2.51	9.81 g/mi	43	1.93 g/mi	9	1.16 g/mi	5	0.3 g/mi	1	7.47 g/mi	33	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	12	0.0357 lb/hr	15	0.0000	0	0.0000	0	0.0953 lb/hr	40	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	146	1.01 g/hp/hr	25	0.16 g/hp/hr	4	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	303	0.75 g/hp/hr	39	0.16 g/hp/hr	8	0.17 g/hp/hr	9	2.15 g/hp/hr	112	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	258	1.76 g/hp/hr	78	0.16 g/hp/hr	7	0.17 g/hp/hr	8	7.34 g/hp/hr	326	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	169	0.75 g/hp/hr	22	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	63	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	92	1 g/hp/hr	16	0.16 g/hp/hr	3	0.18 g/hp/hr	3	8.50 g/hp/hr	135	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.4	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	2.51	0.43 g/mi	0	0.2 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.9 g/mi	3	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	2.51	9.81 g/mi	3	1.93 g/mi	1	1.16 g/mi	0	0.3 g/mi	0	7.47 g/mi	2	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	4							14)
Fugitive dust / unpaved	BACT(%) =	95	20,000	800	0.0528					1.76	4					15)
roads / container trucks	BACT(%) =	90	tons per day	800	0.0528					0.44	1.9					16)
Fugitive dust / unpaved	BACT(%) =	95	7,690	192	0.0528					0.98	0.5					15)
roads / cover haul trucks	BACT(%) =	90	tons per day	192	0.0528					0.24	0.2					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	20,000 tons per day	800	2.51					0.13 lbs/VMT	64					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	7,690 tons per day	192	1.92					0.13 lbs/VMT	12					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	5	NA					17.52 lbs/acre/day	3					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	5	NA					0.62 lbs/acre/day	1					19)
Totals							10503		1055		758		380		3139	
Subtotal in SOCAB							3489		257		170		79		924	20)
Subtotal in Coachella							2678		120		80		58		376	20)
Subtotal in ICAPCD							4336		678		508		242		1840	20)
Subtotal at Site							2352		583		450		198		1434	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2005 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor.
Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2005 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2005 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2005 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments,
linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment.
EMFAC7EP emission factors for light duty trucks in 2005 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991,
as published in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LFG.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with
road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 10FW
Date: 16-Oct-93

Table B.15: Emissions at End of Year 16

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	20,000 tons per day	800 trips/day	32	9.66 g/mi	544	1.88 g/mi	106	1.03 g/mi	58	0.28 g/mi	16	7.41 g/mi	417	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	5 equip-shifts	NA	11.01 g/hp/hr	277	1.01 g/hp/hr	25	0.90 g/hp/hr	23	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
Container truck engines	At LATC		20,000 tons per day	800 trips/day	1	9.66 g/mi	17	1.88 g/mi	3	1.03 g/mi	2	0.28 g/mi	0	7.41 g/mi	13	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	5 equip-shifts	2	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	5 equip-shifts	2	9.66 g/mi	1	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	20,000 tons per day	5 train/day	432		7231		325		215		157		1015	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			268 employees	90	0.59 g/mi	31	0.07 g/mi	4	0.01 g/mi	0.53	0.05 g/mi	2.66	1.98 g/mi	105	9)
LFG generated (100%)			MMCF/day	26												
LFG fugitive (Escape percent =)	20%	Air in ICAPCD	MMCF/day	5				27.3 lb/MMCF	143							10)
LFG flared (Collection percent =)	80%	Air in ICAPCD	MMCF/day	21		0.062 lb/MMBTU	649	0.0100 lb/MMBTU	105	0.0250 lb/MMBTU	262	0.01 lb/MMBTU	126	0.0100 lb/MMBTU	105	11)
Container truck engines	35 Truck speed (MPH)		20,000 tons per day	800 trips/day	2.51	9.66 g/mi	43	1.88 g/mi	8	1.03 g/mi	5	0.28 g/mi	1	7.41 g/mi	33	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	12	0.0357 lb/hr	15					0.0953 lb/hr	40	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	146	1.01 g/hp/hr	25	0.16 g/hp/hr	4	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	303	0.75 g/hp/hr	39	0.16 g/hp/hr	8	0.17 g/hp/hr	9	2.15 g/hp/hr	112	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	258	1.76 g/hp/hr	78	0.16 g/hp/hr	7	0.17 g/hp/hr	8	7.34 g/hp/hr	326	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	169	0.75 g/hp/hr	22	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	63	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	92	1 g/hp/hr	16	0.16 g/hp/hr	3	0.18 g/hp/hr	3	8.50 g/hp/hr	135	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.4	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	2.51	0.32 g/mi	0	0.11 g/mi	0.1	0.01 g/mi	0.0	0.05 g/mi	0	2.28 g/mi	2	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	2.51	9.66 g/mi	3	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	2	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	4							14)
Fugitive dust / unpaved	BACT(%) =	95	20,000	800	0.0528					1.76	4					15)
roads / container trucks	BACT(%) =	90	tons per day	800	0.0528					0.44	1.9					16)
Fugitive dust / unpaved	BACT(%) =	95	12,590	315	0.0528					0.98	0.8					15)
roads / cover haul trucks	BACT(%) =	90	tons per day	315	0.0528					0.24	0.4					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	20,000 tons per day	800	2.51					0.13 lbs/VMT	64					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	12,590 tons per day	315	1.92					0.13 lbs/VMT	19					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	5	NA					17.52 lbs/acre/day	3					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	5	NA					0.62 lbs/acre/day	1					19)
Totals							10350		998		704		353		3086	
Subtotal in SOCAB							3481		255		163		78		920	20)
Subtotal in Coachella							2678		120		80		58		376	20)
Subtotal in ICAPCD							4191		623		462		217		1790	20)
Subtotal at Site							2218		532		403		172		1412	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor.
Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments,
linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment.
EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991,
as published in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LFG.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with
road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 16F
Date: 15-Oct-93

Table B.16: Emissions at End of Year 16 with MSW Residue Conditioning

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	20,000 tons per day	800 trips/day	32	9.66 g/mi	544	1.88 g/mi	106	1.03 g/mi	58	0.28 g/mi	16	7.41 g/mi	417	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	5 equip-shifts	NA	11.01 g/hp/hr	277	1.01 g/hp/hr	25	0.90 g/hp/hr	23	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
Container truck engines	At LATC		20,000 tons per day	800 trips/day	1	9.66 g/mi	17	1.88 g/mi	3	1.03 g/mi	2	0.28 g/mi	0	7.41 g/mi	13	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	5 equip-shifts	2	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	5 equip-shifts	2	9.66 g/mi	1	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	20,000 tons per day	5 train/day	432		7231		325		215		157		1015	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			268 employees	90	0.59 g/mi	31	0.07 g/mi	4	0.01 g/mi	0.53	0.05 g/mi	2.66	1.98 g/mi	105	9)
LFG generated (100%)			MMCF/day	50												
LFG fugitive (Escape percent =)	20%	Air in ICAPCD	MMCF/day	10				27.3 lb/MMCF	271							10)
LFG to boiler (Collection percent =)	80%	Air in ICAPCD	MMCF/day	40		0.035 lb/MMBTU	694	0.0017 lb/MMBTU	34	0.0006 lb/MMBTU	12	0.02 lb/MMBTU	397	0.0002 lb/MMBTU	4	11)
Container truck engines	35 Truck Speed (MPH)		20,000 tons per day	800	2.51	9.66 g/mi	43	1.88 g/mi	8	1.03 g/mi	5	0.28 g/mi	1	7.41 g/mi	33	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	12	0.0357 lb/hr	15	0.0000	0	0.0000	0	0.0953 lb/hr	40	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	146	1.01 g/hp/hr	25	0.16 g/hp/hr	4	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	303	0.75 g/hp/hr	39	0.16 g/hp/hr	8	0.17 g/hp/hr	9	2.15 g/hp/hr	112	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	258	1.76 g/hp/hr	78	0.16 g/hp/hr	7	0.17 g/hp/hr	8	7.34 g/hp/hr	326	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	169	0.75 g/hp/hr	22	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	63	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	92	1 g/hp/hr	16	0.16 g/hp/hr	3	0.18 g/hp/hr	3	8.50 g/hp/hr	135	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.4	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	2.51 2.51	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	2	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	4	9.66 g/mi	4	1.88 g/mi	1	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	3	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	4							14)
Fugitive dust / unpaved	BACT(%) = 95		20,000	800	0.0528					1.76	4					15)
roads / container trucks	BACT(%) = 90		tons per day	800	0.0528					0.44	1.9					16)
Fugitive dust / unpaved	BACT(%) = 95		12,590	315	0.0528					0.98	0.8					15)
roads / cover haul trucks	BACT(%) = 90		tons per day	315	0.0528					0.24	0.4					16)
Fugitive dust / paved roads / container trucks	BACT(%) = 75		20,000 tons per day	800	2.51					0.13 lbs/VMT	64					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) = 75		12,590 tons per day	315	1.92					0.13 lbs/VMT	19					17)
Fugitive dust from landfill equipment	BACT(%) = 90		0.32 ac/dy/4000tpd	5						17.52 lbs/acre/day	3					18)
Wind erosion	BACT(%) = 90		3 ac/dy/4000tpd	5						0.62 lbs/acre/day	1					19)
Totals							10397		1056		454		624		2986	
Subtotal in SOCAB							3481		255		163		78		920	20)
Subtotal in Coachella							2678		120		80		58		376	20)
Subtotal in ICAPCD							4239		681		212		488		1690	20)
Subtotal at Site							2265		590		154		443		1313	

Notes:

NA = Not applicable

1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L

2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.

3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor. Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.

4) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.

5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.

6) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991.

7) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.

8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments, linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%. NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).

9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment. EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.)

10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991, as published in the Draft EIR for Puente Hill, May 1992.

11) SCAQMD Performance Tests on the SPADRA Energy Recovery from Landfill Gas (SPERG) Facility, Oct 91, report by CARNOT for CSDLAC, Apr 92.

12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).

13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.

14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.

15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.

16) State of Wyoming, 1979, Department of Enviroomental Quality. Unpaved roads with silt = 8% and 10 mph.

17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with road surf loading set to 20 lb/mi.

18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.

19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT. USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.

20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.

Filename: MRL 16BW

Date: 15-Oct-93

Table B.17: Emissions at End of Year 85

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	from transfer station in SCAQMD	To LATC in SCAQMD	20,000 tons per day	800 trips/day	32	9.66 g/mi	544	1.88 g/mi	106	1.03 g/mi	58	0.28 g/mi	16	7.41 g/mi	417	1) 2)
Cranes at LATC	285 hp	1 load factor at LATC	8 hrs/equip-shift	5 equip-shifts	NA	11.01 g/hp/hr	277	1.01 g/hp/hr	25	0.90 g/hp/hr	23	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
Container truck engines	At LATC		20,000 tons per day	800 trips/day	1	9.66 g/mi	17	1.88 g/mi	3	1.03 g/mi	2	0.28 g/mi	0	7.41 g/mi	13	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2.20	0.19 g/hp/hr	0.41	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	5 equip-shifts	2	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	5 equip-shifts	2	9.66 g/mi	1	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	20,000 tons per day	5 train/day	432		7231		325		215		157		1015	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			268 employees	90	0.59 g/mi	31	0.07 g/mi	4	0.01 g/mi	1	0.05 g/mi	2.66	1.98 g/mi	105	9)
LFG generated (100%)			MMCF/day	45												
LFG fugitive (Escape percent =)	20%		MMCF/day	9				27.3 lb/MMCF	247							10)
LFG to boiler (Collection percent =)	80%		MMCF/day	36		0.035 lb/MMBTU	632	0.0017 lb/MMBTU	31	0.0006 lb/MMBTU	11	0.02 lb/MMBTU	361	0.0002 lb/MMBTU	4	11)
Container truck engines	35 Truck Speed (MPH)		20,000 tons per day	800	3.73	9.66 g/mi	64	1.88 g/mi	12	1.03 g/mi	7	0.28 g/mi	2	7.41 g/mi	49	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	11	0.0357 lb/hr	14	0.0000	0	0.0000	0	0.0953 lb/hr	38	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	146	1.01 g/hp/hr	25	0.16 g/hp/hr	4	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	303	0.75 g/hp/hr	39	0.16 g/hp/hr	8	0.17 g/hp/hr	9	2.15 g/hp/hr	112	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	258	1.76 g/hp/hr	78	0.16 g/hp/hr	7	0.17 g/hp/hr	8	7.34 g/hp/hr	326	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	169	0.75 g/hp/hr	22	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	63	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	92	1 g/hp/hr	16	0.16 g/hp/hr	3	0.18 g/hp/hr	3	8.50 g/hp/hr	135	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.4	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	3.73	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	3	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	3.73	9.66 g/mi	4	1.88 g/mi	1	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	3	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	4							14)
Fugitive dust / unpaved roads / container trucks	BACT(%) =	95	20,000 tons per day	800	0.0528					1.76	4					15)
	BACT(%) =	90		800	0.0528					0.44	1.9					16)
Fugitive dust / unpaved roads / cover haul trucks	BACT(%) =	95	8,190 tons per day	205	0.0528					0.98	0.5					15)
	BACT(%) =	90		205	0.0528					0.24	0.3					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	20,000 tons per day	800	3.73					0.13 lbs/VMT	95					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	8,190 tons per day	205	4.72					0.13 lbs/VMT	31					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	5	NA					17.52 lbs/acre/day	3					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	5	NA					0.62 lbs/acre/day	1					19)
Totals							10355		1032		498		589		3000	
Subtotal in SOCAB							3481		255		163		78		920	20)
Subtotal in Coachella							2678		120		80		58		376	20)
Subtotal in ICAPCD							4196		657		256		453		1704	20)
Subtotal at Site							2223		566		197		408		1326	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type trac
Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Ta
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments,
linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment.
EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991,
as published in the Draft EIR for Puente Hill, May 1992.
11) SCAQMD Performance Tests on the SPADRA Energy Recovery from Landfill Gas (SPERG) Facility, Oct 91, report by CARNOT for CSDLAC, Apr 92.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with
road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 85B
Date: 15-Oct-93

Table B.18: Emissions at End of Year 85 with MSW Residue Conditioning

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	20,000 tons per day	800 trips/day	32	9.66 g/mi	545	1.88 g/mi	106	1.03 g/mi	58	0.28 g/mi	16	7.41 g/mi	418	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	5 equip-shifts	NA	11.01 g/hp/hr	277	1.01 g/hp/hr	25	0.90 g/hp/hr	23	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
Container truck engines	At LATC		20,000 tons per day	800 trips/day	1	9.66 g/mi	17	1.88 g/mi	3	1.03 g/mi	2	0.28 g/mi	0	7.41 g/mi	13	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	5 equip-shifts	2	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	5 equip-shifts	2	9.66 g/mi	1	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	20,000 tons per day	5 train/day	432		7231		325		215		157		1015	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			268 employees	90	0.59 g/mi	31	0.07 g/mi	4	0.01 g/mi	1	0.05 g/mi	2.66	1.98 g/mi	105	9)
LFG generated (100%)			MMCF/day	84												
LFG fugitive (Escape percent =)	20%	Air in ICAPCD	MMCF/day	17				27.3 lb/MMCF	460							10)
LFG to boiler (Collection percent =)	80%	Air in ICAPCD	MMCF/day	19		0.035 lb/MMBTU	341	0.0017 lb/MMBTU	17	0.0006 lb/MMBTU	6	0.02 lb/MMBTU	195	0.0002 lb/MMBTU	2	11)
100 tpd Liquefied Methane Plant			MMCF/day	48		2.42 lb/MMCF	116	2.50 lb/MMCF	120	0.12 lb/MMCF	6	0.015 lb/MMCF	1	0.50 lb/MMCF	24	11a)
Container truck engines	35 Truck Speed (MPH)		20000 tons per day	800	3.73	9.66 g/mi	63.55	1.88 g/mi	12.37	1.03 g/mi	6.78	0.28 g/mi	1.84	7.41 g/mi	48.75	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	11	0.0357 lb/hr	14	0.0000	0	0.0000	0	0.0953 lb/hr	38	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	146	1.01 g/hp/hr	25	0.16 g/hp/hr	4	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	303	0.75 g/hp/hr	39	0.16 g/hp/hr	8	0.17 g/hp/hr	9	2.15 g/hp/hr	112	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	258	1.76 g/hp/hr	78	0.16 g/hp/hr	7	0.17 g/hp/hr	8	7.34 g/hp/hr	326	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	169	0.75 g/hp/hr	22	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	63	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	92	1 g/hp/hr	16	0.16 g/hp/hr	3	0.18 g/hp/hr	3	8.50 g/hp/hr	135	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/loader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.4	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	3.73	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	3	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	3.73	9.66 g/mi	4	1.88 g/mi	1	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	3	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	4							14)
Fugitive dust / unpaved roads / container trucks	BACT(%) =	95	20,000 tons per day	800	0.0528					1.76	4					15)
	BACT(%) =	90		800	0.0528					0.44	1.9					16)
Fugitive dust / unpaved roads / cover haul trucks	BACT(%) =	95	8,190 hrs/equip-shift	205	0.0528					0.98	0.5					15)
	BACT(%) =	90		205	0.0528					0.24	0.3					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	20,000 tons per day	800	3.73					0.13 lbs/VMT	95					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	8,190 tons per day	205	4.72					0.13 lbs/VMT	31					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	5	NA					17.52 lbs/acre/day	3					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	5	NA					0.62 lbs/acre/day	1					19)
Totals							10181		1351		499		423		3023	
Subtotal in SOCAB							3482		255		163		78		921	20)
Subtotal in Coachella							2678		120		80		58		376	20)
Subtotal in ICAPCD							4021		976		256		287		1727	20)
Subtotal at Site							2048		885		198		242		1349	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor.
Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz-Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments,
linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz-Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment.
EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991,
as published in the Draft EIR for Puente Hill, May 1992.
11) SCAQMD Performance Tests on the SPADRA Energy Recovery from Landfill Gas (SPERG) Facility, Oct 91, report by CARNOT for CSDLAC, Apr 92.
11a) Emissions information from Dr. Wen Kuo of Environmental Systems, personal communication, August 4, 1992.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with
road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 85BLW
Date: 15-Oct-93

Table B.19: Emissions at End of Year 100

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	20,000 tons per day	800 trips/day	32	9.66 g/mi	544	1.88 g/mi	106	1.03 g/mi	58	0.28 g/mi	16	7.41 g/mi	417	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	5 equip-shifts	NA	11.01 g/hp/hr	277	1.01 g/hp/hr	25	0.90 g/hp/hr	23	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
Container truck engines	At LATC		20,000 tons per day	800 trips/day	1	9.66 g/mi	17	1.88 g/mi	3	1.03 g/mi	2	0.28 g/mi	0	7.41 g/mi	13	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	5 equip-shifts	2	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	5 equip-shifts	2	9.66 g/mi	1	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	20,000 tons per day	5 train/day	432		7231		325		215		157		1015	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL		NA	350 employees	90	0.59 g/mi	41	0.07 g/mi	5	0.01 g/mi	1	0.05 g/mi	3.47	1.98 g/mi	138	9)
LFG generated (100%)			MMCF/day	45	NA											
LFG fugitive (Escape percent =)	20%	Air in ICAPCD	MMCF/day	9	NA			27.3 lb/MMCF	247							10)
LFG to boiler (Collection percent =)	80%	Air in ICAPCD	MMCF/day	36		0.035 lb/MMBTU	634	0.0017 lb/MMBTU	31	0.0006 lb/MMBTU	11	0.02 lb/MMBTU	362	0.0002 lb/MMBTU	4	11)
Container truck engines	35 Truck Speed (MPH)		20,000 tons per day	800	3.73	9.66 g/mi	64	1.88 g/mi	12	1.03 g/mi	7	0.28 g/mi	2	7.41 g/mi	49	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	11	0.0357 lb/hr	14	0.0000	0	0.0000	0	0.0953 lb/hr	38	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	146	1.01 g/hp/hr	25	0.16 g/hp/hr	4	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	303	0.75 g/hp/hr	39	0.16 g/hp/hr	8	0.17 g/hp/hr	9	2.15 g/hp/hr	112	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	258	1.76 g/hp/hr	78	0.16 g/hp/hr	7	0.17 g/hp/hr	8	7.34 g/hp/hr	326	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	169	0.75 g/hp/hr	22	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	63	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	92	1 g/hp/hr	16	0.16 g/hp/hr	3	0.18 g/hp/hr	3	8.50 g/hp/hr	135	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.4	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	3.73	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	3	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	3.73	9.66 g/mi	4	1.88 g/mi	1	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	3	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	4							14)
Fugitive dust / unpaved	BACT(%) =	95	20,000	800	0.0528					1.76	4					15)
roads / container trucks	BACT(%) =	90	tons per day	800	0.0528					0.44	1.9					16)
Fugitive dust / unpaved	BACT(%) =	95	8,190	205	0.0528					0.98	0.5					15)
roads / cover haul trucks	BACT(%) =	90	tons per day	205	0.0528					0.24	0.3					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	20,000 tons per day	800	3.73					0.13 lbs/VMT	95					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	8,190 tons per day	205	4.72					0.13 lbs/VMT	31					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	5	NA					17.52 lbs/acre/day	3					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	5	NA					0.62 lbs/acre/day	1					19)
Totals							10366		1033		498		591		3032	
Subtotal in SOCAB							3481		255		163		78		920	20)
Subtotal in Coachella							2678		120		80		58		376	20)
Subtotal in ICAPCD							4207		658		256		454		1736	20)
Subtotal at Site							2225		566		197		409		1326	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor.
Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments,
linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment.
EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991,
as published in the Draft EIR for Puente Hill, May 1992.
11) SCAQMD Performance Tests on the SPADRA Energy Recovery from Landfill Gas (SPERG) Facility, Oct 91, report by CARNOT for CSDLAC, Apr 92.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with
road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 100B
Date: 15-Oct-93

Table B.19a: Emissions at End of Year 100 with LFG Methane to Pipeline

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	20,000 tons per day	800 trips/day	32	9.66 g/mi	544	1.88 g/mi	106	1.03 g/mi	58	0.28 g/mi	16	7.41 g/mi	417	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	5 equip-shifts	NA	11.01 g/hp/hr	277	1.01 g/hp/hr	25	0.90 g/hp/hr	23	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
Container truck engines	At LATC		20,000 tons per day	800 trips/day	1	9.66 g/mi	17	1.88 g/mi	3	1.03 g/mi	2	0.28 g/mi	0	7.41 g/mi	13	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	5 equip-shifts	2	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	5 equip-shifts	2	9.66 g/mi	1	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	20,000 tons per day	5 train/day	432		7231		325		215		157		1015	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL		NA	350 employees	90	0.59 g/mi	41	0.07 g/mi	5	0.01 g/mi	1	0.05 g/mi	3.47	1.98 g/mi	138	9)
LFG generated (100%)			MMCF/day	45	NA											
LFG fugitive (Escape percent =)	20%	Air in ICAPCD	MMCF/day	9	NA			27.3 lb/MMCF	247							10)
LFG to Pipeline (Collection percent =)	80%	Air in ICAPCD	MMCF/day	36		2.42 lb/MMCF	88	1.90 lb/MMCF	69	0.12 lb/MMCF	4	0.015 lb/MMCF	1	0.50 lb/MMCF	18	11)
Container truck engines	35 Truck Speed (MPH)		20,000 tons per day	800	3.73	9.66 g/mi	64	1.88 g/mi	12	1.03 g/mi	7	0.28 g/mi	2	7.41 g/mi	49	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	11	0.0357 lb/hr	14	0.0000	0	0.0000	0	0.0953 lb/hr	38	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	146	1.01 g/hp/hr	25	0.16 g/hp/hr	4	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	303	0.75 g/hp/hr	39	0.16 g/hp/hr	8	0.17 g/hp/hr	9	2.15 g/hp/hr	112	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	258	1.76 g/hp/hr	78	0.16 g/hp/hr	7	0.17 g/hp/hr	8	7.34 g/hp/hr	326	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	169	0.75 g/hp/hr	22	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	63	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	92	1 g/hp/hr	16	0.16 g/hp/hr	3	0.18 g/hp/hr	3	8.50 g/hp/hr	135	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.4	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	3.73	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	3	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	3.73	9.66 g/mi	4	1.88 g/mi	1	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	3	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	4							14)
Fugitive dust / unpaved roads / container trucks	BACT(%) = 95		20,000 tons per day	800	0.0528					1.76	4					15)
	BACT(%) = 90			800	0.0528					0.44	1.9					16)
Fugitive dust / unpaved roads / cover haul trucks	BACT(%) = 95		8,190 tons per day	205	0.0528					0.98	0.5					15)
	BACT(%) = 90			205	0.0528					0.24	0.3					16)
Fugitive dust / paved roads / container trucks	BACT(%) = 75		20,000 tons per day	800	3.73					0.13 lbs/VMT	95					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) = 75		8,190 tons per day	205	4.72					0.13 lbs/VMT	31					17)
Fugitive dust from landfill equipment	BACT(%) = 90		0.32 ac/dy/4000tpd	5	NA					17.52 lbs/acre/day	3					18)
Wind erosion	BACT(%) = 90		3 ac/dy/4000tpd	5	NA					0.62 lbs/acre/day	1					19)
Totals							9820		1071		491		229		3047	
Subtotal in SOCAB							3481		255		163		78		920	20)
Subtotal in Coachella							2678		120		80		58		376	20)
Subtotal in ICAPCD							3661		696		249		93		1751	20)
Subtotal at Site							1679		604		191		47		1341	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor.
Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments,
linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment.
EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991,
as published in the Draft EIR for Puente Hill, May 1992.
11) SCAQMD Performance Tests on the SPADRA Energy Recovery from Landfill Gas (SPERG) Facility, Oct 91, report by CARNOT for CSDLAC, Apr 92.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with
road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 100B Pipeline
Date: 15-Oct-93

Table B.19b: Emissions at End of Year 100 with Liquefied LFG Methane

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	20,000 tons per day	800 trips/day	32	9.66 g/mi	544	1.88 g/mi	106	1.03 g/mi	58	0.28 g/mi	16	7.41 g/mi	417	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	5 equip-shifts	NA	11.01 g/hp/hr	277	1.01 g/hp/hr	25	0.90 g/hp/hr	23	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
Container truck engines	At LATC		20,000 tons per day	800 trips/day	1	9.66 g/mi	17	1.88 g/mi	3	1.03 g/mi	2	0.28 g/mi	0	7.41 g/mi	13	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shif	5 equip-shifts	2	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shif	5 equip-shifts	2	9.66 g/mi	1	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	20,000 tons per day	5 train/day	432		7231		325		215		157		1015	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL		NA	350 employees	90	0.59 g/mi	41	0.07 g/mi	5	0.01 g/mi	1	0.05 g/mi	3.47	1.98 g/mi	138	9)
LFG generated (100%)			MMCF/day	45	NA											
LFG fugitive (Escape percent =)	20%	Air in ICAPCD	MMCF/day	9	NA			27.3 lb/MMCF	247							10)
LFG to Liq Methane Plant (Collection percent =)	80%	Air in ICAPCD	MMCF/day	36		2.42 lb/MMCF	88	2.5 lb/MMCF	91	0.12 lb/MMCF	4	0.015 lb/MMCF	1	0.50 lb/MMCF	18	11) 11a)
Container truck engines	35 Truck Speed (MPH)		20,000 tons per day	800	3.73	9.66 g/mi	64	1.88 g/mi	12	1.03 g/mi	7	0.28 g/mi	2	7.41 g/mi	49	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	11	0.0357 lb/hr	14	0.0000	0	0.0000	0	0.0953 lb/hr	38	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	146	1.01 g/hp/hr	25	0.16 g/hp/hr	4	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	303	0.75 g/hp/hr	39	0.16 g/hp/hr	8	0.17 g/hp/hr	9	2.15 g/hp/hr	112	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	258	1.76 g/hp/hr	78	0.16 g/hp/hr	7	0.17 g/hp/hr	8	7.34 g/hp/hr	326	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	169	0.75 g/hp/hr	22	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	63	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	92	1 g/hp/hr	16	0.16 g/hp/hr	3	0.18 g/hp/hr	3	8.50 g/hp/hr	135	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.4	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shif	30 trucks	3.73	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	3	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shif	16 trucks	3.73	9.66 g/mi	4	1.88 g/mi	1	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	3	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	4							14)
Fugitive dust / unpaved roads / container trucks	BACT(%) = 95		20,000 tons per day	800	0.0528					1.76	4					15)
	BACT(%) = 90			800	0.0528					0.44	1.9					16)
Fugitive dust / unpaved roads / cover haul trucks	BACT(%) = 95		7,820 tons per day	196	0.0528					0.98	0.5					15)
	BACT(%) = 90			196	0.0528					0.24	0.3					16)
Fugitive dust / paved roads / container trucks	BACT(%) = 75		20,000 tons per day	800	3.73					0.13 lbs/VMT	95					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) = 75		7,820 tons per day	196	4.72					0.13 lbs/VMT	29					17)
Fugitive dust from landfill equipment	BACT(%) = 90		0.32 ac/dy/4000tpd	5	NA					17.52 lbs/acre/day	3					18)
Wind erosion	BACT(%) = 90		3 ac/dy/4000tpd	5	NA					0.62 lbs/acre/day	1					19)
Totals							9820		1093		490		229		3047	
Subtotal in SOCAB							3481		255		163		78		920	20)
Subtotal in Coachella							2678		120		80		58		376	20)
Subtotal in ICAPCD							3661		718		248		93		1751	20)
Subtotal at Site							1679		626		189		47		1341	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor. Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-I
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments, linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment.
EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991, as published in the Draft EIR for Puente Hill, May 1992.
11) SCAQMD Performance Tests on the SPADRA Energy Recovery from Landfill Gas (SPERG) Facility, Oct 91, report by CARNOT for CSDLAC, Apr 92.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 100B L.MethPlant
Date: 15-Oct-93

Table B.20: Emissions at End of Year 100 with MSW Residue Conditioning

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	20,000 tons per day	800 trips/day	32	9.66 g/mi	544	1.88 g/mi	106	1.03 g/mi	58	0.28 g/mi	16	7.41 g/mi	417	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	5 equip-shifts	NA	11.01 g/hp/hr	277	1.01 g/hp/hr	25	0.90 g/hp/hr	23	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
Container truck engines	At LATC	NA	20,000 tons per day	800 trips/day	1	9.66 g/mi	17	1.88 g/mi	3	1.03 g/mi	2	0.28 g/mi	0	7.41 g/mi	13	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	5 equip-shifts	2	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	5 equip-shifts	2	9.66 g/mi	1	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	20,000 tons per day	5 train/day	432		7231		325		215		157		1015	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL		NA	268 employees	90	0.59 g/mi	31	0.07 g/mi	4	0.01 g/mi	1	0.05 g/mi	2.66	1.98 g/mi	105	9)
LFG generated (100%)			MMCF/day	85												
LFG fugitive (Escape percent =)	20%	Air in ICAPCD	MMCF/day	17				27.30 lb/MMCF	461							10)
LFG to boiler (Collection percent =)	80%	Air in ICAPCD	MMCF/day	20		0.035 lb/MMBTU	343	0.0017 lb/MMBTU	17	0.0006 lb/MMBTU	6	0.02 lb/MMBTU	196	0.0002 lb/MMBTU	2	11)
100 tpd Liquefied Methane Plant			MMCF/day	48		2.42 lb/MMCF	116	2.50 lb/MMCF	120	0.12 lb/MMCF	6	0.015 lb/MMCF	1	0.50 lb/MMCF	24	11a)
Container truck engines	35 Truck Speed (MPH)		20,000 tons per day	800	3.73	9.66 g/mi	64	1.88 g/mi	12	1.03 g/mi	7	0.28 g/mi	2	7.41 g/mi	49	4)
Idling emissions			7 hrs/truck/shift/day	12 tractors/shift	NA	0.0291 lb/hr	11	0.0357 lb/hr	14	0.0000	0	0.0000	0	0.0953 lb/hr	38	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	146	1.01 g/hp/hr	25	0.16 g/hp/hr	4	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	303	0.75 g/hp/hr	39	0.16 g/hp/hr	8	0.17 g/hp/hr	9	2.15 g/hp/hr	112	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	258	1.76 g/hp/hr	78	0.16 g/hp/hr	7	0.17 g/hp/hr	8	7.34 g/hp/hr	326	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	169	0.75 g/hp/hr	22	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	63	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	92	1 g/hp/hr	16	0.16 g/hp/hr	3	0.18 g/hp/hr	3	8.50 g/hp/hr	135	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/loader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.4	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	3.73	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	3	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	3.73	9.66 g/mi	4	1.88 g/mi	1	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	3	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	4							14)
Fugitive dust / unpaved roads / container trucks	BACT(%) =	95	20,000 tons per day	800	0.0528					1.76	4					15)
	BACT(%) =	90		800	0.0528					0.44	1.9					16)
Fugitive dust / unpaved roads / cover haul trucks	BACT(%) =	95	8,190 hrs/equip-shift	205	0.0528					0.98	0.5					15)
	BACT(%) =	90		205	0.0528					0.24	0.3					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	20,000 tons per day	800	3.73					0.13 lbs/VMT	95					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	8,190 tons per day	205	4.72					0.13 lbs/VMT	31					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	5	NA					17.52 lbs/acre/day	3					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	5	NA					0.62 lbs/acre/day	1					19)
Totals							10182		1352		499		425		3023	
Subtotal in SOCAB							3481		255		163		78		920	20)
Subtotal in Coachella							2678		120		80		58		376	20)
Subtotal in ICAPCD							4024		978		256		289		1727	20)
Subtotal at Site							2051		887		198		244		1349	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor.
Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments,
linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment.
EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991,
as published in the Draft EIR for Puente Hill, May 1992.
11) SCAQMD Performance Tests on the SPADRA Energy Recovery from Landfill Gas (SPERG) Facility, Oct 91, report by CARNOT for CSDLAC, Apr 92.
11a) Emissions information from Dr. Wen Kuo of Environmental Systems, personal communication, August 4, 1992.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with
road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 100BLW
Date: 15-Oct-93

Table B.20a: Emissions at End of Year 100 with MSW Residue Conditioning and LFG Methane to Pipeline

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	20,000 tons per day	800 trips/day	32	9.66 g/mi	544	1.88 g/mi	106	1.03 g/mi	58	0.28 g/mi	16	7.41 g/mi	417	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	5 equip-shifts	NA	11.01 g/hp/hr	277	1.01 g/hp/hr	25	0.90 g/hp/hr	23	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
Container truck engines	At LATC	NA	20,000 tons per day	800 trips/day	1	9.66 g/mi	17	1.88 g/mi	3	1.03 g/mi	2	0.28 g/mi	0	7.41 g/mi	13	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	5 equip-shifts	2	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	5 equip-shifts	2	9.66 g/mi	1	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	20,000 tons per day	5 train/day	432		7231		325		215		157		1015	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL		NA	268 employees	90	0.59 g/mi	31	0.07 g/mi	4	0.01 g/mi	1	0.05 g/mi	2.66	1.98 g/mi	105	9)
LFG generated (100%)			MMCF/day	85												
LFG fugitive (Escape percent =)	20%	Air in ICAPCD	MMCF/day	17				27.30 lb/MMCF	461							10)
LFG to Pipeline (Collection percent =)	80%	Air in ICAPCD	MMCF/day	68		2.42 lb/MMCF	164	1.90 lb/MMCF	128	0.12 lb/MMCF	8	0.015 lb/MMCF	1	0.50 lb/MMCF	34	11) 11a)
Container truck engines	35 Truck Speed (MPH)		20,000 tons per day	800	3.73	9.66 g/mi	63.55	1.88 g/mi	12.37	1.03 g/mi	6.78	0.28 g/mi	1.84	7.41 g/mi	48.75	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	11	0.0357 lb/hr	14	0.0000	0	0.0000	0	0.0953 lb/hr	38	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	146	1.01 g/hp/hr	25	0.16 g/hp/hr	4	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	303	0.75 g/hp/hr	39	0.16 g/hp/hr	8	0.17 g/hp/hr	9	2.15 g/hp/hr	112	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	258	1.76 g/hp/hr	78	0.16 g/hp/hr	7	0.17 g/hp/hr	8	7.34 g/hp/hr	326	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	5 equip shifts	NA	5.80 g/hp/hr	169	0.75 g/hp/hr	22	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	63	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	92	1 g/hp/hr	16	0.16 g/hp/hr	3	0.18 g/hp/hr	3	8.50 g/hp/hr	135	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/loader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.4	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	3.73	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	3	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	3.73	9.66 g/mi	4	1.88 g/mi	1	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	3	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	4							14)
Fugitive dust / unpaved roads / container trucks	BACT(%) =	95	20,000 tons per day	800	0.0528					1.76	4					15)
	BACT(%) =	90		800	0.0528					0.44	1.9					16)
Fugitive dust / unpaved roads / cover haul trucks	BACT(%) =	95	8,190 hrs/equip-shift	205	0.0528					0.98	0.5					15)
	BACT(%) =	90		205	0.0528					0.24	0.3					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	20,000 tons per day	800	3.73					0.13 lbs/VMT	95					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	8,190 tons per day	205	4.72					0.13 lbs/VMT	31					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	5	NA					17.52 lbs/acre/day	3					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	5	NA					0.62 lbs/acre/day	1					19)
Totals							9887		1344		495		229		3030	
Subtotal in SOCAB							3481		255		163		78		920	20)
Subtotal in Coachella							2678		120		80		58		376	20)
Subtotal in ICAPCD							3728		969		253		93		1734	20)
Subtotal at Site							1755		878		195		48		1357	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor. Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments, linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment.
EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991, as published in the Draft EIR for Puente Hill, May 1992.
11) SCAQMD Performance Tests on the SPADRA Energy Recovery from Landfill Gas (SPERG) Facility, Oct 91, report by CARNOT for CSDLAC, Apr 92.
11a) Emissions information from Dr. Wen Kuo of Environmental Systems, personal communication, August 4, 1992.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 100BLW Pipeline
Date: 15-Oct-93

Table B.20b: Emissions at End of Year 100 with MSW Residue Conditioning and Liquefied LFG Methane

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	20,000 tons per day	800 trips/day	32	9.66 g/mi	544	1.88 g/mi	106	1.03 g/mi	58	0.28 g/mi	16	7.41 g/mi	417	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	5 equip-shifts	NA	11.01 g/hp/hr	277	1.01 g/hp/hr	25	0.90 g/hp/hr	23	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
Container truck engines	At LATC	NA	20,000 tons per day	800 trips/day	1	9.66 g/mi	17	1.88 g/mi	3	1.03 g/mi	2	0.28 g/mi	0	7.41 g/mi	13	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	5 equip-shifts	2	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	5 equip-shifts	2	9.66 g/mi	1	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	20,000 tons per day	5 train/day	432		7231		325		215		157		1015	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL		NA	268 employees	90	0.59 g/mi	31	0.07 g/mi	4	0.01 g/mi	1	0.05 g/mi	2.66	1.98 g/mi	105	9)
LFG generated (100%)			MMCF/day	85												
LFG fugitive (Escape percent =)	20%	Air in ICAPCD	MMCF/day	17				27.30 lb/MMCF	461							10)
LFG to Liq Methane Plant (Collection percent =)	80%	Air in ICAPCD	MMCF/day	68		2.42 lb/MMCF	164	2.5 lb/MMCF	169	0.12 lb/MMCF	8	0.015 lb/MMCF	1	0.50 lb/MMCF	34	11) 11a)
Container truck engines	35 Truck Speed (MPH)		20,000 tons per day	800	3.73	9.66 g/mi	63.55	1.88 g/mi	12.37	1.03 g/mi	6.78	0.28 g/mi	1.84	7.41 g/mi	48.75	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	11	0.0357 lb/hr	14	0.0000	0	0.0000	0	0.0953 lb/hr	38	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	146	1.01 g/hp/hr	25	0.16 g/hp/hr	4	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	303	0.75 g/hp/hr	39	0.16 g/hp/hr	8	0.17 g/hp/hr	9	2.15 g/hp/hr	112	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	258	1.76 g/hp/hr	78	0.16 g/hp/hr	7	0.17 g/hp/hr	8	7.34 g/hp/hr	326	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	169	0.75 g/hp/hr	22	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	63	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	92	1 g/hp/hr	16	0.16 g/hp/hr	3	0.18 g/hp/hr	3	8.50 g/hp/hr	135	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/loader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.4	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	3.73	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	3	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	3.73	9.66 g/mi	4	1.88 g/mi	1	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	3	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	4							14)
Fugitive dust / unpaved	BACT(%) =	95	20,000	800	0.0528					1.76	4					15)
roads / container trucks	BACT(%) =	90	tons per day	800	0.0528					0.44	1.9					16)
Fugitive dust / unpaved	BACT(%) =	95	8,190	205	0.0528					0.98	0.5					15)
roads / cover haul trucks	BACT(%) =	90	hrs/equip-shift	205	0.0528					0.24	0.3					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	20,000 tons per day	800	3.73					0.13 lbs/VMT	95					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	8,190 tons per day	205	4.72					0.13 lbs/VMT	31					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	5	NA					17.52 lbs/acre/day	3					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	5	NA					0.62 lbs/acre/day	1					19)
Totals							9887		1385		495		229		3030	
Subtotal in SOCAB							3481		255		163		78		920	20)
Subtotal in Coachella							2678		120		80		58		376	20)
Subtotal in ICAPCD							3728		1010		253		93		1734	20)
Subtotal at Site							1755		919		195		48		1357	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor.
Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments,
linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment.
EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991,
as published in the Draft EIR for Puente Hill, May 1992.
11) SCAQMD Performance Tests on the SPADRA Energy Recovery from Landfill Gas (SPERG) Facility, Oct 91, report by CARNOT for CSDLAC, Apr 92.
11a) Emissions information from Dr. Wen Kuo of Environmental Systems, personal communication, August 4, 1992.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with
road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 100BLWL.MethPlant
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TABLE B.21
METHANE GAS UNIT GENERATION RATES

Infiltration fraction =		0.3									Ww*i=(m'i+mpi)/			
		(mdi+m'i)/	mi =				Mi				(mdi+m'i+mpi)	ai mdi Ww*i/Mi	G (CH4)	
i	Waste type	(md+m') (%)	mdi+m'i (lb)	Wwi (%)	Molecule	ai	(lb/mole)	mdi (lb)	m'i (lb)	mpi (lb)	(%)	(moles)	(cu ft/lb)	Ref
Precipitation (in/yr) =		4												1
1	Food	13	0.13	70	C6H12O6	6	180	0.04	0.09	1.38E-03	70.31	9.14E-04	0.18	2
2	Paper	31	0.31	6	C6H10O5	6	162	0.29	0.02	1.03E-02	9.02	9.74E-04	0.19	2
3	Vegetation	16	0.16	60	C6H10O5	6	162	0.06	0.10	2.26E-03	60.56	1.44E-03	0.28	2
4	Remainder	40	0.4	6	Inorganic	0	NA	0.38	0.02	0.00E+00	6.00	0	0.00	2
SUM	Solid waste	100	1	NA	NA	NA	NA	0.7704	0.23	1.40E-02	NA	3.32E-03	0.64	
Precipitation (in/yr) =		4												1
1	Food	20	0.2	70	C6H12O6	6	180	0.06	0.14	2.68E-03	70.40	1.41E-03	0.27	3
2	Paper	20	0.2	6	C6H10O5	6	162	0.19	0.01	8.41E-03	9.79	6.82E-04	0.13	3
3	Vegetation	16	0.16	60	C6H10O5	6	162	0.06	0.10	2.86E-03	60.70	1.44E-03	0.28	3
4	Remainder	44	0.44	6	Inorganic	0	NA	0.41	0.03	0.00E+00	6.00	0	0.00	3
SUM	Solid waste	100	1	NA	NA	NA	NA	0.7256	0.27	1.40E-02	NA	3.53E-03	0.68	
Precipitation (in/yr) =		22.5												4
1	Food	13	0.13	70	C6H12O6	6	180	0.04	0.09	7.76E-03	71.69	9.32E-04	0.18	2
2	Paper	31	0.31	6	C6H10O5	6	162	0.29	0.02	5.80E-02	20.81	2.25E-03	0.43	2
3	Vegetation	16	0.16	60	C6H10O5	6	162	0.06	0.10	1.27E-02	62.95	1.49E-03	0.29	2
4	Remainder	40	0.4	6	Inorganic	0	NA	0.38	0.02	0.00E+00	6.00	0	0.00	2
SUM	Solid waste	100	1	NA	NA	NA	NA	0.7704	0.23	7.85E-02	NA	4.67E-03	0.90	
Precipitation (in/yr) =		22.5												4
1	Food	20	0.2	70	C6H12O6	6	180	0.06	0.14	1.51E-02	72.10	1.44E-03	0.28	3
2	Paper	20	0.2	6	C6H10O5	6	162	0.19	0.01	4.73E-02	23.97	1.67E-03	0.32	3
3	Vegetation	16	0.16	60	C6H10O5	6	162	0.06	0.10	1.61E-02	63.66	1.51E-03	0.29	3
4	Remainder	44	0.44	6	Inorganic	0	NA	0.41	0.03	0.00E+00	6.00	0	0.00	3
SUM	Solid waste	100	1	NA	NA	NA	NA	0.7256	0.27	7.85E-02	NA	4.62E-03	0.89	
Precipitation (in/yr) =		0												5
1	Food	13	0.13	70	C6H12O6	6	180	0.04	0.09	0.00E+00	70.00	9.10E-04	0.18	2
2	Paper	31	0.31	6	C6H10O5	6	162	0.29	0.02	0.00E+00	6.00	6.48E-04	0.12	2
3	Vegetation	16	0.16	60	C6H10O5	6	162	0.06	0.10	0.00E+00	60.00	1.42E-03	0.27	2
4	Remainder	40	0.4	6	Inorganic	0	NA	0.38	0.02	0.00E+00	6.00	0	0.00	2
SUM	Solid waste	100	1	NA	NA	NA	NA	0.7704	0.23	0.00E+00	NA	2.98E-03	0.58	
Precipitation (in/yr) =		0												5
1	Food	20	0.2	70	C6H12O6	6	180	0.06	0.14	0.00E+00	70.00	1.40E-03	0.27	3
2	Paper	20	0.2	6	C6H10O5	6	162	0.19	0.01	0.00E+00	6.00	4.18E-04	0.08	3
3	Vegetation	16	0.16	60	C6H10O5	6	162	0.06	0.10	0.00E+00	60.00	1.42E-03	0.27	3
4	Remainder	44	0.44	6	Inorganic	0	NA	0.41	0.03	0.00E+00	6.00	0	0.00	3
SUM	Solid waste	100	1	NA	NA	NA	NA	0.7256	0.27	0.00E+00	NA	3.24E-03	0.63	

Notes:
1) Precipitation at Mesquite Regional Landfill.
2) Proportion of four main components in MSW residue according to Environmental Solutions, Inc. model of effect of AB 939 during 1995-1999.
3) Proportion of four main components in MSW residue according to Environmental Solutions, Inc. model of effect of AB 939 after 1999.
4) Precipitation at Sunshine Canyon = 22.5" as noted in Los Angeles County Sanitation Districts, 1990, Integrated Solid Waste Management System for Los Angeles County, Draft Program EIR, State Clearinghouse, Number 89010419, August. 22.5"/yr precip. actually measured at Aliso Canyon.
5) Zero precipitation is used to represent the case of anaerobic decomposition in the containers during transit.

Filename: Unit Gen/O5/Rev 2
Date: 15-Oct-93

TABLE B.22
METHANE GAS UNIT GENERATION RATES WITH MSW RESIDUE CONDITIONING

i	Waste type	(mdi+m'i)/ (md+m') (%)	mi = mdi+m'i (lb)	Wwi (%)	Molecule	ai	Mi (lb/mole)	mdi (lb)	m'i (lb)	mpi (lb)	Ww*i=(m'i+mpi)/ (mdi+m'i+mpi) (%)	ai mdi Ww*i/Mi (moles)	G (CH4) (cu ft/lb)	Ref
Infiltration fraction =		1												
Precipitation (in/yr) =		**24**												1
1	Food	13	0.13	70	C6H12O6	6	180	0.04	0.09	2.76E-02	75.25	9.78E-04	0.19	2
2	Paper	31	0.31	6	C6H10O5	6	162	0.29	0.02	2.06E-01	43.54	4.70E-03	0.91	2
3	Vegetation	16	0.16	60	C6H10O5	6	162	0.06	0.10	4.53E-02	68.82	1.63E-03	0.31	2
4	Remainder	40	0.4	6	Inorganic	0	NA	0.38	0.02	0.00E+00	6.00	0	0.00	2
SUM	Solid waste	100	1	NA	NA	NA	NA	0.7704	0.23	2.79E-01	NA	7.31E-03	1.41	
Precipitation (in/yr) =		**24**												1
1	Food	20	0.2	70	C6H12O6	6	180	0.06	0.14	5.37E-02	76.35	1.53E-03	0.29	3
2	Paper	20	0.2	6	C6H10O5	6	162	0.19	0.01	1.68E-01	48.93	3.41E-03	0.66	3
3	Vegetation	16	0.16	60	C6H10O5	6	162	0.06	0.10	5.72E-02	70.54	1.67E-03	0.32	3
4	Remainder	44	0.44	6	Inorganic	0	NA	0.41	0.03	0.00E+00	6.00	0	0.00	3
SUM	Solid waste	100	1	NA	NA	NA	NA	0.7256	0.27	2.79E-01	NA	6.61E-03	1.27	

Notes:
1) Equivalent precipitation at full infiltration to bring Ww* = 0.4.
2) Proportion of four main components in MSW residue according to Environmental Solutions, Inc. model of effect of AB 939 during 1995-1999.
3) Proportion of four main components in MSW residue according to Environmental Solutions, Inc. model of effect of AB 939 after 1999.
Filename: Aug Unit Gen/O5/R1
Date: 15-Oct-93

TABLE B.23
METHANE AND LANDFILL GAS GENERATION
WITH NORMAL PRECIPITATION

Parameter																						
Years in operation	-	1	2	2	3	3	3	5	5	5	6	6	6	7	7	7	7	8	8	8	8	8
Start of Landfilling	Start: Jan 1,	1996	1996	1997	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998	2002	1996	1997	1998	2002	2003
End of Landfilling	End: Jan 1,	1997	1997	1998	1997	1998	1999	1997	1998	2001	1997	1998	2002	1997	1998	2002	2003	1997	1998	2002	2003	2004
Duration of Landfilling	Units\Yrs>	1	1	1	1	1	1	1	1	3	1	1	4	1	1	4	1	1	1	4	1	1
Waste flowrate, max	tons per day	4,000	4,000	8,000	4,000	8,000	12,000	4,000	8,000	12,000	4,000	8,000	12,000	4,000	8,000	12,000	16,000	4,000	8,000	12,000	16,000	20,000
Waste in place	million tons	1	1	2	1	2	4	1	2	11	1	2	15	1	2	15	5	1	2	15	5	6
Cumulative waste in place	million tons	1	1	4	1	4	7	1	4	15	1	4	18	1	4	18	23	1	4	18	23	29
Total CH4 per unit SW (G)	cu ft per lb	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.65	0.64	0.64	0.66	0.64	0.64	0.66	0.68	0.64	0.64	0.66	0.68	0.68
CH4/LFG half life	years	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Max LFG gen. rate	MMCF/day	0.57		1.14			1.71			4.90			6.39				2.43				2.43	3.03
Max LFG gen. rate	scfm	397		793			1190			3405			4436				1685				1685	2107
Max CH4 gen. rate	MMCF/day	0.29		0.57			0.86			2.45			3.19				1.21				1.21	1.52
Time after closure	years	0	1	0	2	1	0	4	3	0	5	4	0	6	5	1	0	7	6	2	1	0
Later LFG gen. rate	MMCF/day		0.53		0.50	1.07		0.43	0.93		0.40	0.87		0.38	0.81	5.96		0.35	0.75	5.56		
Later LFG gen. rate	scfm		370		345	740		301	644		280	601		262	561	4139		244	523	3862		
Later CH4 gen. rate	MMCF/day		0.27		0.25	0.53		0.22	0.46		0.20	0.43		0.19	0.40	2.98		0.18	0.38	2.78		
Cumulative LFG gen. rate	MMCF/day	0.57	0.53	1.67	0.50	1.56	3.28	0.43	1.36	6.26	0.40	1.27	7.66	0.38	1.18	7.14	9.57	0.35	1.11	6.67	9.09	12.13
Cumulative LFG gen. rate	scfm	397	370	1163	345	1085	2275	301	945	4350	280	882	5318	262	822	4961	6647	244	767	4629	6315	8421
LFG Condensate	gallons/day	217	202	434	189	405	651	164	353	1863	153	329	2427	143	307	2265	922	134	286	2113	922	1153
Cumulative Condensate	gallons/day	217	202	636	189	594	1245	164	517	2380	153	482	2910	143	450	2715	3637	134	420	2533	3455	4608

Filename: MRL LFG Gen/B.23

TABLE B.23 (continued)
METHANE AND LANDFILL GAS GENERATION
WITH NORMAL PRECIPITATION

Parameter																					
Years in operation	-	10	10	10	10	10	16	16	16	16	16	85	85	85	85	85	100	100	100	100	100
Start of Landfilling	Start: Jan 1,	1996	1997	1998	2002	2003	1996	1997	1998	2002	2003	1996	1997	1998	2002	2003	1996	1997	1998	2002	2003
End of Landfilling	End: Jan 1,	1997	1998	2002	2003	2006	1997	1998	2002	2003	2012	1997	1998	2002	2003	2081	1997	1998	2002	2003	2096
Duration of Landfilling	Units\Yrs>	1	1	4	1	3	1	1	4	1	9	1	1	4	1	78	1	1	4	1	93
Waste flowrate, max	tons per day	4,000	8,000	12,000	16,000	20,000	4,000	8,000	12,000	16,000	20,000	4,000	8,000	12,000	16,000	20,000	4,000	8,000	12,000	16,000	20,000
Waste in place	million tons	1	2	15	5	18	1	2	15	5	55	1	2	15	5	474	1	2	15	5	565
Cumulative waste in place	million tons	1	4	18	23	41	1	4	18	23	78	1	4	18	23	497	1	4	18	23	589
Total CH4 per unit SW (G)	cu ft per lb	0.64	0.64	0.66	0.68	0.68	0.64	0.64	0.66	0.68	0.68	0.64	0.64	0.66	0.68	0.68	0.64	0.64	0.66	0.68	0.68
CH4/LFG half life	years	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Max LFG gen. rate	MMCF/day				2.43	8.50					21.03					45.10					45.24
Max LFG gen. rate	scfm				1685	5906					14601					31323					31414
Max CH4 gen. rate	MMCF/day				1.21	4.25					10.51					22.55					22.62
Time after closure	years	9	8	4	3	0	15	14	10	9	0	84	83	79	78	0	99	98	94	93	0
Later LFG gen. rate	MMCF/day	0.31	0.66	4.84			0.20	0.43	3.19	1.30		0.00	0.00	0.03	0.01		0.00	0.00	0.01	0.00	
Later LFG gen. rate	scfm	213	456	3362			140	301	2218	903		1	3	19	8		0	1	7	3	
Later CH4 gen. rate	MMCF/day	0.15	0.33	2.42			0.10	0.22	1.60	0.65		0.001	0.002	0.013	0.005		0.000	0.001	0.005	0.002	
Cumulative LFG gen. rate	MMCF/day	0.31	0.96	5.80	8.23	16.74	0.20	0.63	3.83	5.13	26.15	0.002	0.005	0.032	0.043	45.15	0.001	0.002	0.011	0.015	45.25
Cumulative LFG gen. rate	scfm	213	668	4030	5715	11622	140	441	2659	3562	18163	1	4	22	30	31353	0	1	8	11	31425
LFG Condensate	gallons/day	116	249	1840	922	3232	77	164	1214	494	7990	1	1	10	4	17140	0	0	4	1	17190
Cumulative Condensate	gallons/day	116	366	2205	3128	6359	77	241	1455	1949	9939	1	2	12	16	17156	0	1	4	6	17196

Filename: MRL LFG Gen/B.23

TABLE B.24
METHANE AND LANDFILL GAS GENERATION
WITH MSW RESIDUE CONDITIONING

Parameter																						
Years in operation	-	1	2	2	3	3	3	5	5	5	6	6	6	7	7	7	7	8	8	8	8	8
Start of Landfilling	Start: Jan 1,	1996	1996	1997	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998	2002	1996	1997	1998	2002	2003
End of Landfilling	End: Jan 1,	1997	1997	1998	1997	1998	1999	1997	1998	2001	1997	1998	2002	1997	1998	2002	2003	1997	1998	2002	2003	2004
Duration of Landfilling	Units\Yrs>	1	1	1	1	1	1	1	1	3	1	1	4	1	1	4	1	1	1	4	1	1
Waste flowrate, max	tons per day	4,000	4,000	8,000	4,000	8,000	12,000	4,000	8,000	12,000	4,000	8,000	12,000	4,000	8,000	12,000	16,000	4,000	8,000	12,000	16,000	20,000
Waste in place	million tons	1	1	2	1	2	4	1	2	11	1	2	15	1	2	15	5	1	2	15	5	6
Cumulative waste in place	million tons	1	1	4	1	4	7	1	4	15	1	4	18	1	4	18	23	1	4	18	23	29
Total CH4 per unit SW (G)	cu ft per lb	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.36	1.41	1.41	1.34	1.41	1.41	1.34	1.27	1.41	1.41	1.34	1.27	1.27
CH4/LFG half life	years	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Max LFG gen. rate	MMCF/day	1.26		2.52			3.77			10.23			12.97				4.53					5.67
Max LFG gen. rate	scfm	874		1747			2621			7105			9006				3148					3934
Max CH4 gen. rate	MMCF/day	0.63		1.26			1.89			5.12			6.48				2.27					2.83
Time after closure	years	0	1	0	2	1	0	4	3	0	5	4	0	6	5	1	0	7	6	2	1	0
Later LFG gen. rate	MMCF/day		1.17		1.10	2.35		0.95	2.04		0.89	1.91		0.83	1.78	12.10		0.77	1.66	11.29	4.23	
Later LFG gen. rate	scfm		815		761	1630		662	1419		618	1324		576	1236	8403		538	1153	7841	2937	
Later CH4 gen. rate	MMCF/day		0.59		0.55	1.17		0.48	1.02		0.44	0.95		0.42	0.89	6.05		0.39	0.83	5.65	2.11	
Cumulative LFG gen. rate	MMCF/day	1.26	1.17	3.69	1.10	3.44	7.22	0.95	3.00	13.23	0.89	2.80	15.77	0.83	2.61	14.71	19.24	0.77	2.43	13.73	17.95	23.62
Cumulative LFG gen. rate	scfm	874	815	2562	761	2391	5012	662	2081	9186	618	1942	10949	576	1812	10215	13363	538	1691	9532	12468	16403
LFG Condensate	gallons/day	478	446	956	416	892	1434	362	777	3888	338	725	4928	315	676	4598	1722	294	631	4290	1607	2153
Cumulative Condensate	gallons/day	478	446	1402	416	1308	2742	362	1139	5027	338	1063	5991	315	992	5590	7312	294	925	5216	6823	8976

Filename: Rev Wet LFG Gen

TABLE B.24 (continued)
METHANE AND LANDFILL GAS GENERATION
WITH MSW RESIDUE CONDITIONING

Parameter																					
Years in operation	-	10	10	10	10	10	16	16	16	16	16	85	85	85	85	85	100	100	100	100	100
Start of Landfilling	Start: Jan 1,	1996	1997	1998	2002	2003	1996	1997	1998	2002	2003	1996	1997	1998	2002	2003	1996	1997	1998	2002	2003
End of Landfilling	End: Jan 1,	1997	1998	2002	2003	2006	1997	1998	2002	2003	2012	1997	1998	2002	2003	2081	1997	1998	2002	2003	2096
Duration of Landfilling	Units\Yrs>	1	1	4	1	3	1	1	4	1	9	1	1	4	1	78	1	1	4	1	93
Waste flowrate, max	tons per day	4,000	8,000	12,000	16,000	20,000	4,000	8,000	12,000	16,000	20,000	4,000	8,000	12,000	16,000	20,000	4,000	8,000	12,000	16,000	20,000
Waste in place	million tons	1	2	15	5	18	1	2	15	5	55	1	2	15	5	474	1	2	15	5	565
Cumulative waste in place	million tons	1	4	18	23	41	1	4	18	23	78	1	4	18	23	497	1	4	18	23	589
Total CH4 per unit SW (G)	cu ft per lb	1.41	1.41	1.34	1.27	1.27	1.41	1.41	1.34	1.27	1.27	1.41	1.41	1.34	1.27	1.27	1.41	1.41	1.34	1.27	1.27
CH4/LFG half life	years	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Max LFG gen. rate	MMCF/day					15.88					39.27					84.24					84.49
Max LFG gen. rate	scfm					11031					27269					58500					58671
Max CH4 gen. rate	MMCF/day					7.94					19.63					42.12					42.24
Time after closure	years	9	8	4	3	0	15	14	10	9	0	84	83	79	78	0	99	98	94	93	0
Later LFG gen. rate	MMCF/day	0.67	1.45	9.83	3.68		0.44	0.95	6.49	2.43		0.00	0.01	0.05	0.02		0.00	0.00	0.02	0.01	
Later LFG gen. rate	scfm	468	1004	6826	2557		309	662	4504	1687		3	6	38	14		1	2	13	5	
Later CH4 gen. rate	MMCF/day	0.34	0.72	4.91	1.84		0.22	0.48	3.24	1.21		0.00	0.00	0.03	0.01		0.00	0.00	0.01	0.00	
Cumulative LFG gen. rate	MMCF/day	0.67	2.12	11.95	15.63	31.51	0.44	1.40	7.88	10.31	49.58	0.00	0.01	0.07	0.09	84.33	0.00	0.00	0.02	0.03	84.52
Cumulative LFG gen. rate	scfm	468	1472	8298	10855	21885	309	971	5475	7162	34431	3	8	46	60	58560	1	3	16	21	58692
LFG Condensate	gallons/day	256	549	3735	1399	6036	169	362	2465	923	14922	1	3	21	8	32011	1	1	7	3	32105
Cumulative Condensate	gallons/day	256	805	4541	5940	11976	169	531	2996	3919	18841	1	4	25	33	32044	1	2	9	12	32116

Filename: Rev Wet LFG Gen

Table B.25: Construction Emissions

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Light-duty std vehicle (gasoline) engines	Commuting employees	Air in ICAPCD		150 employees	90	1.15 g/mi	34	0.29 g/mi	9	0.01 g/mi	0.30	0.06 g/mi	1.79	4.74 g/mi	141	1)
Diesel electric generators	680 hp	10 hours per day		2		14 g/hp/hr	420	1.12 g/hp/hr	34	1 g/hp/hr	30	0.1862 g/hp/hr	6	3.03 g/hp/hr	91	2)
Gravel truck engines			6,000 tons per day	250 trips/day	4	11.41 g/mi	25	2.19 g/mi	5	2.05 g/mi	5	0.33 g/mi	1	7.81 g/mi	17	3)
D8 dozer engines	285 hp	0.8 load factor	8 hrs/equip-shift	1.5 equip-shifts	NA	6.90 g/hp/hr	42	0.75 g/hp/hr	5	0.40 g/hp/hr	2	0.17 g/hp/hr	1	2.15 g/hp/hr	13	4)
815 compactor engines	216 hp	0.8 load factor	8 hrs/equip-shift	1.5 equip-shifts	NA	6.90 g/hp/hr	32	1.76 g/hp/hr	8	0.40 g/hp/hr	2	0.17 g/hp/hr	1	7.34 g/hp/hr	34	4)
637E scraper engines	700 hp	0.8 load factor	8 hrs/equip-shift	1.5 equip-shifts	NA	6.90 g/hp/hr	102	0.75 g/hp/hr	11	0.40 g/hp/hr	6	0.17 g/hp/hr	3	2.15 g/hp/hr	32	4)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	7 trucks	NA	6.90 g/hp/hr	153	1 g/hp/hr	22	0.40 g/hp/hr	9	0.18 g/hp/hr	4	8.50 g/hp/hr	189	4)
16 ton (4000 gal) water truck engines	220 hp	0.4 load factor	8 hrs/equip-shift	1.5 equip-shifts	NA	6.90 g/hp/hr	16	1 g/hp/hr	2	0.40 g/hp/hr	1	0.18 g/hp/hr	0	8.50 g/hp/hr	20	4)
14G Grader engine	200 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	6.90 g/hp/hr	110	0.36 g/hp/hr	6	0.40 g/hp/hr	6	0.17 g/hp/hr	3	1.54 g/hp/hr	24	4)
988B Loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	6.90 g/hp/hr	154	0.97 g/hp/hr	22	0.40 g/hp/hr	9	0.17 g/hp/hr	4	2.71 g/hp/hr	60	4)
Light-duty std PU truck (gasoline) engines			8 hrs/equip-shift	30 trucks	200	1.15 g/mi	15	0.29 g/mi	4	0.01 g/mi	0.13	0.06 g/mi	0.79	4.74 g/mi	63	5)
Medium/heavy-duty truck (diesel) engines			2 hrs/equip-shift	5 trucks	40	11.41 g/mi	5	2.19 g/mi	1	2.05 g/mi	1	0.33 g/mi	0	7.81 g/mi	3	6)
Fueling area evaporation								0.82 lb/dy/4000tpd	1							7)
Fugitive dust / unpaved roads / gravel trucks	BACT(%) =	90	6,000 tons per day	250	4					2.75 lbs/VMT	275					8) 9)
Fugitive dust from construction equipment	BACT(%) =	90	3 ac/dy/4000tpd	1.5						18 lbs/acre/day	8					10)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	1.5						0.62 lbs/acre/day	0.3					11)
Total in ICAPCD							1108		129		354		24		687	
Subtotal at Site							1073		120		354		23		546	

Notes:
NA = Not applicable
1) 150 employees will drive an average of 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe to work at MRL.
E7EPSCF2 emission factors for light duty trucks in 1996 at 75F and 55mph (CARB run 1/24/1991.
2) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
SOx factor divided by 5 because S content of diesel fuel is decreasing from 0.25% to 0.05% by October 1, 1993 in response to CAAA.
3) CARB, 1991, E7EPSCF2 at 75F for 1996 heavy duty diesel trucks at 25mph. These factors are higher than those from USEPA (1991). SOx factor is 1/5 that in SCAQMD, 1987, Air Quality Handbook for preparing EIRs, Appendix L (taken from EMFAC7C).USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.1, assuming model year 1991-2000 and 50,000 miles driven.
4) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1.
5) E7EPSCF2 emission factors for light duty trucks in 1996 at 75F and 25mph (CARB run 1/24/1991.
6) E7EPSCF2 emission factors for medium duty trucks in 1996 at 75F and 25mph (CARB run 1/24/1991. Same as for heavy duty trucks.
7) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
8) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 25mph.
9) 0.10 is the fugitive dust escape factor after BACT (e.g., watering) has reduced fugitive emissions 90%.
10) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
11) Assumes silt content = 1.6%, 0 precip. days, and 21.9% TSP = PM10.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
Filename: MRL 1993C
Date: 16-Oct-93

Table B.26: Los Angeles County Landfill Emissions at End of Year 16

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To landfills in SCAQMD	20,000 tons per day	1000 trips/day	90	9.66 g/mi	1913	1.88 g/mi	372	1.03 g/mi	204	0.28 g/mi	56	7.41 g/mi	1467	1) 2)
Light-duty std vehicle (gasoline) engines	Employees commuting to LAC landfills	Air in SCAQMD	NA	268 employees	90	0.59 g/mi	31	0.07 g/mi	4	0.01 g/mi	1	0.05 g/mi	3	1.98 g/mi	105	3)
LFG generated (100%)	At LAC landfills	Air in SCAQMD	MMCF/day	34	NA											
LFG fugitive (Escape percent =)	20%		MMCF/day	7	NA			27.3 lb/MMCF	188							4)
LFG flared (Collection percent =)	80%		MMCF/day	28	NA	0.062 lb/MMBTU	855	0.010 lb/MMBTU	138	0.025 lb/MMBTU	345	0.012 lb/MMBTU	165	0.01 lb/MMBTU	138	5)
Container truck engines	At LAC landfills		20,000 tons per day	1000 trips/day	4	9.66 g/mi	85	1.88 g/mi	17	1.03 g/mi	9	0.28 g/mi	2	7.41 g/mi	65	6)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	303	0.75 g/hp/hr	39	0.16 g/hp/hr	8	0.17 g/hp/hr	9	2.15 g/hp/hr	112	7)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	258	1.76 g/hp/hr	78	0.16 g/hp/hr	7	0.17 g/hp/hr	8	7.34 g/hp/hr	326	7)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	169	0.75 g/hp/hr	22	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	88	7)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	270	7)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	92	1 g/hp/hr	16	0.16 g/hp/hr	3	0.18 g/hp/hr	3	8.50 g/hp/hr	108	7)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	25	7)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	101	7)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.4	3.03 g/hp/hr	6.7	8)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	4.00	0.59 g/mi	1	0.07 g/mi	0.1	0.01 g/mi	0.0	0.05 g/mi	0	1.98 g/mi	2	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	4.00	9.66 g/mi	4	1.88 g/mi	1	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	3	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	4							11)
Fugitive dust / unpaved roads / transfer trucks	BACT(%) =	95	20,000 tons per day	1000	0.0528					1.76	5					12)
	BACT(%) =	90		1000	0.0528					0.44	2.3					13)
Fugitive dust / unpaved roads / cover haul trucks	BACT(%) =	95	4,706 tons per day	94	0.0528					0.98	0.2					12)
	BACT(%) =	90		94	0.0528					0.24	0.1					13)
Fugitive dust / paved roads / transfer trucks	At LAC landfills BACT(%) =	Air in SCAQMD 75	20,000 tons per day	1000	2.51					0.13 lbs/VMT	32					14)
Fugitive dust / paved roads / cover haul trucks	At LAC landfills BACT(%) =	Air in SCAQMD 75	4,706 tons per day	94	1.92					0.13 lbs/VMT	6					14)
Fugitive dust from landfill equipment	At LAC landfills BACT(%) =	Air in SCAQMD 90	0.32 ac/dy/4000tpd	5	NA					17.52 lbs/acre/day	3					15)
Wind erosion	At LAC landfills BACT(%) =	Air in SCAQMD 90	3 ac/dy/4000tpd	5	NA					0.62 lbs/acre/day	1					16)
Totals in SCAQMD							4255		955		647		266		2817	
Subtotal at Site							2311		579		442		208		1245	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Transfer truck holds 20 tons MSW. Transfer/compactor stations in heart of Los Angeles are 45 miles from landfills in Los Angeles in Year 100.
3) Employees will drive an average of 90 mi. round trip to work at Los Angeles landfills.
EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.)
4) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991, as published in the Draft EIR for Puente Hill, May 1992.
5) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LFG.
6) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor.
7) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
8) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991.
9) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
10) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
11) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8%, 20 mph and BACT = 95%.
12) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8%, 10 mph and BACT = 90%.
13) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with road surf loading set to 0.011 oz/sq yd (20 lb/mi).
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
15) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
Filename: LAC 16F
Date: 15-Oct-93

Table B.27: Los Angeles County Landfill Emissions at End of Year 100

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Transfer truck engines	From transfer stations in SCAQMD	To landfills in SCAQMD	20,000 tons per day	1000 trips/day	90	9.66 g/mi	1913	1.88 g/mi	372	1.03 g/mi	204	0.28 g/mi	56	7.41 g/mi	1467	1) 2)
Light-duty std vehicle (gasoline) engines	Employees commuting to LAC landfills	Air in SCAQMD	NA	268 employees	90	0.59 . g/mi	1	0.07 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	1.98 g/mi	2	3)
LFG generated (100%)	At LAC landfills	Air in SCAQMD	MMCF/day	59												
LFG fugitive (Escape percent =)	20%		MMCF/day	12				27.3 lb/MMCF	323							4)
LFG to boiler (Collection percent =)	80%		MMCF/day	47		0.035 lb/MMBTU	829	0.0017 lb/MMBTU	40	0.0006 lb/MMBTU	14	0.02 lb/MMBTU	474	0.0002 lb/MMBTU	5	5)
Transfer truck engines	At LAC landfills		20,000 tons per day	1000 trips/day	3.73	9.66 g/mi	79	1.88 g/mi	15	1.03 g/mi	8	0.28 g/mi	2	7.41 g/mi	61	1)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	303	0.75 g/hp/hr	39	0.16 g/hp/hr	8	0.17 g/hp/hr	9	2.15 g/hp/hr	112	6)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	258	1.76 g/hp/hr	78	0.16 g/hp/hr	7	0.17 g/hp/hr	8	7.34 g/hp/hr	326	6)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	169	0.75 g/hp/hr	22	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	63	6)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	6)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	92	1 g/hp/hr	16	0.16 g/hp/hr	3	0.18 g/hp/hr	3	8.50 g/hp/hr	135	6)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	6)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	6)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/day/grader	5 graders	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0	3.03 g/hp/hr	7	7)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	3.73	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	3	8)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	3.73	9.66 g/mi	4	1.88 g/mi	1	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	3	9)
Fueling area evaporation	At LAC landfills	Air in SCAQMD						0.82 lb/dy/4000tpd	4							10)
Fugitive dust / unpaved roads / container trucks	BACT(%) =	95	20,000 tons per day	1000	0.0528					1.76	5					11)
	BACT(%) =	90		1000	0.0528					0.44	2.3					12)
Fugitive dust / unpaved roads / cover haul trucks	BACT(%) =	95	7,820 tons per day	196	0.0528					0.98	0.5					11)
	BACT(%) =	90		196	0.0528					0.24	0.3					12)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	20,000 tons per day	1000	3.73					0.13 lbs/VMT	119					13)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	7,820 tons per day	196	4.72					0.13 lbs/VMT	29					13)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	5	NA					17.52 lbs/acre/day	3					14)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	5	NA					0.62 lbs/acre/day	1					15)
Totals in SCAQMD							4193		988		427		572		2656	
Subtotal at Site							2279		616		222		516		1187	

Notes:

NA = Not applicable

1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Transfer truck holds 20 tons MSW. Transfer/compactor stations in heart of Los Angeles are 45 miles from landfills in Los Angeles in Year 100.
3) Employees will drive an average of 90 mi. round trip to work at Los Angeles landfills.
   EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.)
4) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991, as published in the Draft EIR for Puente Hill, May 1992.
5) SCAQMD Performance Tests on the SPADRA Energy Recovery from Lanfill Gas (SPERG) Facility, Oct 91, report by CARNOT for CSDLAC, Apr 92.
6) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor.
7) USEPA, 1985, Compilation of air pollutant emission factors, Volume 1, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
   SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
8) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991.
9) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
10) USEPA, 1985, Compilation of air pollutant emission factors, Volume 1: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
11) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8%, 20 mph and BACT = 95%.
12) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8%, 10 mph and BACT = 90%.
13) USEPA, 1985, Compilation of air pollutant emission factors, Vol 1: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with road surf loading set to 0.011 oz/sq yd (20 lb/mi).
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume 1: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
15) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
   USEPA, 1985, Compilation of air pollutant emission factors, Volume 1: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.

Filename: LAC 100B

Date: 15-Oct-93

TABLE B.28
METHANE AND LANDFILL GAS GENERATION FOR NORMAL PRECIPITATION AT "NO ACTION" ALTERNATIVE LANDFILLS IN LOS ANGELES COUNTY

Parameter																					
Years in operation	-	1	2	2	6	6	6	7	7	7	7	16	16	16	16	16	85	85	85	85	85
Start of Landfilling	Start: Jan 1,	1996	1996	1997	1996	1997	1998	1996	1997	1998	2002	1996	1997	1998	2002	2003	1996	1997	1998	2002	2003
End of Landfilling	End: Jan 1,	1997	1997	1998	1997	1998	2002	1997	1998	2002	2003	1997	1998	2002	2003	2012	1997	1998	2002	2003	2081
Duration of Landfilling	Units\Yrs>	1	1	1	1	1	4	1	1	4	1	1	1	4	1	9	1	1	4	1	78
Waste flowrate, max	tons per day	4,000	4,000	8,000	4,000	8,000	12,000	4,000	8,000	12,000	16,000	4,000	8,000	12,000	16,000	20,000	4,000	8,000	12,000	16,000	20,000
Waste in place	million tons	1	1	2	1	2	15	1	2	15	5	1	2	15	5	55	1	2	15	5	474
Cumulative waste in place	million tons	1	1	4	1	4	18	1	4	18	23	1	4	18	23	78	1	4	18	23	497
Total CH4 per unit SW (G)	cu ft per lb	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.89	0.90	0.90	0.90	0.89	0.89	0.90	0.90	0.90	0.89	0.89
CH4/LFG half life	years	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Max LFG gen. rate	MMCF/day	0.80		1.61			8.71				3.18					27.52					59.03
Max LFG gen. rate	scfm	558		1115			6049				2206					19110					40996
Max CH4 gen. rate	MMCF/day	0.40		0.80			4.36				1.59					13.76					29.52
Time after closure	years	0	1	0	5	4	0	6	5	1	0	15	14	10	9	0	84	83	79	78	0
Later LFG gen. rate	MMCF/day		0.75		0.57	1.22		0.53	1.14	8.13		0.28	0.61	4.36	1.70		0.00	0.01	0.04	0.01	
Later LFG gen. rate	scfm		520		394	845		368	789	5644		197	423	3025	1182		2	4	25	10	
Later CH4 gen. rate	MMCF/day		0.37		0.28	0.61		0.26	0.57	4.06		0.14	0.30	2.18	0.85		0.00	0.00	0.02	0.01	
Cumulative LFG gen. rate	MMCF/day	0.80	0.75	2.36	0.57	1.79	10.50	0.53	1.67	9.79	12.97	0.28	0.89	5.25	6.95	34.47	0.00	0.01	0.04	0.06	59.09
Cumulative LFG gen. rate	scfm	558	520	1636	394	1240	7289	368	1157	6801	9006	197	620	3645	4827	23937	2	5	31	40	41037
LFG Condensate	gallons/day	305	285	610	216	463	3310	201	432	3088	1207	108	231	1655	647	10457	1	2	14	5	22433
Cumulative Condensate	gallons/day	305	285	895	216	678	3988	201	633	3721	4928	108	339	1994	2641	13098	1	3	17	22	22455

NOTES:
C = calculated.
1) Environmental Solutions, Inc.
2) Condensate produced by cooling LFG at Puente Hills LF rate of 380 gal/MMCF.
Filename: LAC LFG Gen/O5

TABLE B.28 (continued)

Parameter						
Years in operation	-	100	100	100	100	100
Start of Landfilling	Start: Jan 1,	1996	1997	1998	2002	2003
End of Landfilling	End: Jan 1,	1997	1998	2002	2003	2096
Duration of Landfilling	Units\Yrs>	1	1	4	1	93
Waste flowrate, max	tons per day	4,000	8,000	12,000	16,000	20,000
Waste in place	million tons	1	2	15	5	565
Cumulative waste in place	million tons	1	4	18	23	589
Total CH4 per unit SW (G)	cu ft per lb	0.90	0.90	0.90	0.89	0.89
CH4/LFG half life	years	10	10	10	10	10
Max LFG gen. rate	MMCF/day					59.21
Max LFG gen. rate	scfm					41116
Max CH4 gen. rate	MMCF/day					29.60
Time after closure	years	99	98	94	93	0
Later LFG gen. rate	MMCF/day	0.00	0.00	0.01	0.01	
Later LFG gen. rate	scfm	1	1	9	4	
Later CH4 gen. rate	MMCF/day	0.00	0.00	0.01	0.00	
Cumulative LFG gen. rate	MMCF/day	0.00	0.00	0.02	0.02	59.23
Cumulative LFG gen. rate	scfm	1	2	11	14	41130
LFG Condensate	gallons/day	0	1	5	2	22499
Cumulative Condensate	gallons/day	0	1	6	8	22506

Table B.29: Emissions for 12,000 tpd at End of Year 16

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	12,000 tons per day	480 trips/day	32	9.66 g/mi	326	1.88 g/mi	64	1.03 g/mi	35	0.28 g/mi	9	7.41 g/mi	250	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	3 equip-shifts	NA	11.01 g/hp/hr	166	1.01 g/hp/hr	15	0.90 g/hp/hr	14	0.19 g/hp/hr	3	4.60 g/hp/hr	69	3)
Container truck engines	At LATC		12,000 tons per day	480 trips/day	1	9.66 g/mi	10	1.88 g/mi	2	1.03 g/mi	1	0.28 g/mi	0	7.41 g/mi	8	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	3 equip-shifts	NA	14.00 g/hp/hr	19	1.12 g/hp/hr	1	1.00 g/hp/hr	1	0.19 g/hp/hr	0	3.03 g/hp/hr	4	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	3 equip-shifts	2	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	3 equip-shifts	2	9.66 g/mi	0	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	12,000 tons per day	3 train/day	432		4339		195		129		94		609	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			183 employees	90	0.59 g/mi	21	0.07 g/mi	3	0.01 g/mi	0.36	0.05 g/mi	1.82	1.98 g/mi	72	9)
LFG generated (100%)			MMCF/day	18												
LFG fugitive (Escape percent =)	20%	Air in ICAPCD	MMCF/day	4				27.3 lb/MMCF	99							10)
LFG flared (Collection percent =)	80%	Air in ICAPCD	MMCF/day	15		0.062 lb/MMBTU	450	0.0100 lb/MMBTU	73	0.0250 lb/MMBTU	182	0.01 lb/MMBTU	87	0.0100 lb/MMBTU	73	11)
Container truck engines	35 Truck speed (MPH)		12,000 tons per day	480	2.51	9.66 g/mi	26	1.88 g/mi	5	1.03 g/mi	3	0.28 g/mi	1	7.41 g/mi	20	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	7	0.0357 g/hp/hr	9	0.0000	0	0.0000	0	0.0953 g/hp/hr	24	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	3 equip-shifts	NA	5.80 g/hp/hr	87	1.01 g/hp/hr	15	0.16 g/hp/hr	2	0.19 g/hp/hr	3	4.60 g/hp/hr	69	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	3 equip-shifts	NA	5.80 g/hp/hr	182	0.75 g/hp/hr	23	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	67	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	3 equip-shifts	NA	5.80 g/hp/hr	155	1.76 g/hp/hr	47	0.16 g/hp/hr	4	0.17 g/hp/hr	5	7.34 g/hp/hr	196	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	3 equip-shifts	NA	5.80 g/hp/hr	101	0.75 g/hp/hr	13	0.16 g/hp/hr	3	0.17 g/hp/hr	3	2.15 g/hp/hr	38	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	3 equip-shifts	NA	5.80 g/hp/hr	55	1 g/hp/hr	10	0.16 g/hp/hr	2	0.18 g/hp/hr	2	8.50 g/hp/hr	81	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	3 equip-shifts	NA	14.00 g/hp/hr	19	1.12 g/hp/hr	1	1.00 g/hp/hr	1	0.19 g/hp/hr	0.2	3.03 g/hp/hr	4	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	2.51	0.32 g/mi	0	0.11 g/mi	0.1	0.01 g/mi	0.0	0.05 g/mi	0	2.28 g/mi	2	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	2.51	9.66 g/mi	3	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	2	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	2							14)
Fugitive dust / unpaved roads / container trucks	BACT(%) =	95	12,000 tons per day	480	0.0528					1.76	2					15)
	BACT(%) =	90		480	0.0528					0.44	1.1					16)
Fugitive dust / unpaved roads / cover haul trucks	BACT(%) =	95	12,590 tons per day	315	0.0528					0.98	0.8					15)
	BACT(%) =	90		315	0.0528					0.24	0.4					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	12,000 tons per day	480	2.51					0.13 lbs/VMT	39					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	12,590 tons per day	315	1.92					0.13 lbs/VMT	19					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	3	NA					17.52 lbs/acre/day	2					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	3	NA					0.62 lbs/acre/day	1					19)
Totals							6480		652		461		230		2061	
Subtotal in SOCAB							2088		153		98		47		552	20)
Subtotal in Coachella							1607		72		48		35		226	20)
Subtotal in ICAPCD							2785		427		316		148		1283	20)
Subtotal at Site							1599		373		281		121		1048	

Notes:

NA = Not applicable

1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L

2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.

3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor. Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.

4) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.

5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.

6) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991.

7) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.

8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments, linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%. NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives; technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).

9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment. EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.)

10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991, as published in the Draft EIR for Puente Hill, May 1992.

11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LFG.

12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).

13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.

14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.

15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.

16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.

17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with road surf loading set to 20 lb/mi.

18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.

19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT. USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.

20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.

Filename: Rev MRL 12KTPD F

Date: 15-Oct-93

TABLE B.30
METHANE AND LANDFILL GAS GENERATION
FOR ALTERNATIVE II (12KTPD)

Parameter													
Years in operation	-	1	2	2	6	6	6	16	16	16	166	166	166
Start of Landfilling	Start: Jan 1,	1996	1996	1997	1996	1997	1998	1996	1997	1998	1996	1997	1998
End of Landfilling	End: Jan 1,	1997	1997	1998	1997	1998	2002	1997	1998	2012	1997	1998	2162
Duration of Landfilling	Units\Yrs>	1	1	1	1	1	4	1	1	14	1	1	164
Waste flowrate, max	tons per day	4,000	4,000	8,000	4,000	8,000	12,000	4,000	8,000	12,000	4,000	8,000	12,000
Waste in place	million tons	1	1	2	1	2	15	1	2	51	1	2	598
Cumulative waste in place	million tons	1	1	4	1	4	18	1	4	55	1	4	602
Total CH4 per unit SW (G)	cu ft per lb	0.64	0.64	0.64	0.64	0.64	0.66	0.64	0.64	0.68	0.64	0.64	0.68
CH4/LFG half life	years	10	10	10	10	10	10	10	10	10	10	10	10
Max LFG gen. rate	MMCF/day	0.57		1.14			6.39			16.88			27.18
Max LFG gen. rate	scfm	397		793			4436			11723			18878
Max CH4 gen. rate	MMCF/day	0.29		0.57			3.19			8.44			13.59
Time after closure	years	0	1	0	5	4	0	5	4	0	5	4	0
Later LFG gen. rate	MMCF/day		0.53		0.40	0.87		0.40	0.87		0.40	0.87	
Later LFG gen. rate	scfm		370		280	601		280	601		280	601	
Later CH4 gen. rate	MMCF/day		0.27		0.20	0.43		0.20	0.43		0.20	0.43	
Cumulative LFG gen. rate	MMCF/day	0.57	0.53	1.67	0.40	1.27	7.66	0.40	1.27	18.15	0.40	1.27	28.45
Cumulative LFG gen. rate	scfm	397	370	1163	280	882	5318	280	882	12605	280	882	19760
LFG Condensate	gallons/day	217	202	434	153	329	2427	153	329	6415	153	329	10330
Cumulative Condensate	gallons/day	217	202	636	153	482	2910	153	482	6897	153	482	10813

NOTES:
C = calculated.
1) Environmental Solutions, Inc.
2) Condensate produced by cooling LFG at Puente Hills LF rate of 380 gal/MMCF.
Filename: ALT II MRL LFG Gen/R1

Table B.31: Emissions for 30,000 tpd at End of Year 73

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations In SCAQMD	To LATC In SCAQMD	32,000 tons per day	1280 trips/day	32	9.66 g/mi	871	1.88 g/mi	169	1.03 g/mi	93	0.28 g/mi	25	7.41 g/mi	668	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	8 equip-shifts	NA	11.01 g/hp/hr	443	1.01 g/hp/hr	41	0.90 g/hp/hr	36	0.19 g/hp/hr	7	4.60 g/hp/hr	185	3)
Container truck engines	At LATC		32,000 tons per day	1280 trips/day	1	9.66 g/mi	27	1.88 g/mi	5	1.03 g/mi	3	0.28 g/mi	1	7.41 g/mi	21	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	8 equip-shifts	NA	14.00 g/hp/hr	49	1.12 g/hp/hr	4	1.00 g/hp/hr	4	0.19 g/hp/hr	1	3.03 g/hp/hr	11	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shift	8 equip-shifts	2	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shift	8 equip-shifts	2	9.66 g/mi	1	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	1	7)
Trains (by notch)	From LATC In SCAQMD	To MRL In ICAPCD	32,000 tons per day	8 train/day	432		11570		520		344		251		1624	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL		NA	350 employees	90	0.59 g/mi	41	0.07 g/mi	5	0.01 g/mi	1	0.05 g/mi	3.47	1.98 g/mi	138	9)
LFG generated (100%)			MMCF/day	67	NA											
LFG fugitive (Escape percent =)	20%	Air in ICAPCD	MMCF/day	13	NA			27.3 lb/MMCF	367							10)
LFG to boiler (Collection percent =)	80%	Air in ICAPCD	MMCF/day	54		0.035 lb/MMBTU	940	0.002 lb/MMBTU	46	0.001 lb/MMBTU	16	0.020 lb/MMBTU	537	0.0002 lb/MMBTU	5	11)
Container truck engines	35 Truck Speed (MPH)		32,000 tons per day	1280 trips/day	3.73	9.66 g/mi	102	1.88 g/mi	20	1.03 g/mi	11	0.28 g/mi	3	7.41 g/mi	78	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	18	0.0357 lb/hr	23	0.0000	0	0.0000	0	0.0953 lb/hr	60	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	8 equip-shifts	NA	5.80 g/hp/hr	233	1.01 g/hp/hr	41	0.16 g/hp/hr	6	0.19 g/hp/hr	7	4.60 g/hp/hr	185	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	8 equip-shifts	NA	5.80 g/hp/hr	484	0.75 g/hp/hr	63	0.16 g/hp/hr	13	0.17 g/hp/hr	14	2.15 g/hp/hr	180	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	8 equip-shifts	NA	5.80 g/hp/hr	412	1.76 g/hp/hr	125	0.16 g/hp/hr	11	0.17 g/hp/hr	12	7.34 g/hp/hr	522	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	8 equip-shifts	NA	5.80 g/hp/hr	270	0.75 g/hp/hr	35	0.16 g/hp/hr	7	0.17 g/hp/hr	8	2.15 g/hp/hr	100	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	8 equip-shifts	NA	5.80 g/hp/hr	147	1 g/hp/hr	25	0.16 g/hp/hr	4	0.18 g/hp/hr	5	8.50 g/hp/hr	216	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	8 equip-shifts	NA	14.00 g/hp/hr	49	1.12 g/hp/hr	4	1.00 g/hp/hr	4	0.19 g/hp/hr	0.7	3.03 g/hp/hr	11	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shift	30 trucks	3.73	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	3	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shift	16 trucks	3.73	9.66 g/mi	4	1.88 g/mi	1	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	3	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	7							14)
Fugitive dust / unpaved roads / container trucks	BACT(%) =	95	32,000 tons per day	1280	0.0528					1.76	6					15)
	BACT(%) =	90		1280	0.0528					0.44	3.0					16)
Fugitive dust / unpaved roads / cover haul trucks	BACT(%) =	95	8,190 tons per day	205	0.0528					0.98	0.5					15)
	BACT(%) =	90		205	0.0528					0.24	0.3					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	32,000 tons per day	1280	3.73					0.13 lbs/VMT	153					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	8,190 tons per day	205	4.72					0.13 lbs/VMT	31					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	8	NA					17.52 lbs/acre/day	4					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	8	NA					0.62 lbs/acre/day	1					19)
Totals							16177		1573		767		892		4482	
Subtotal in SOCAB							5569		407		260		125		1472	20)
Subtotal in Coachella							4285		193		127		93		601	20)
Subtotal in ICAPCD							6323		973		380		674		2409	20)
Subtotal at Site							3175		829		287		603		1835	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor.
Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments,
linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment.
EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991,
as published in the Draft EIR for Puente Hill, May 1992.
11) SCAQMD Performance Tests on the SPADRA Energy Recovery from Landfill Gas (SPERG) Facility, Oct 91, report by CARNOT for CSDLAC, Apr 92.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with
road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: 30 KTPD MRL 73B
Date: 15-Oct-93

TABLE B.32
METHANE AND LANDFILL GAS GENERATION WITH NORMAL PRECIPITATION AND 30,000 TPD

Parameter																
Years in operation	-	1	2	2	6	6	6	7	7	7	7	13	13	13	13	13
Start of Landfilling	Start: Jan 1,	1996	1996	1997	1996	1997	1998	1996	1997	1998	2002	1996	1997	1998	2002	2003
End of Landfilling	End: Jan 1,	1997	1997	1998	1997	1998	2002	1997	1998	2002	2003	1997	1998	2002	2003	2009
Duration of Landfilling	Units\Yrs>	1	1	1	1	1	4	1	1	4	1	1	1	4	1	6
Waste flowrate, max	tons per day	4,000	4,000	8,000	4,000	8,000	12,000	4,000	8,000	12,000	16,000	4,000	8,000	12,000	16,000	20,000
Waste in place	million tons	1	1	2	1	2	15	1	2	15	5	1	2	15	5	36
Cumulative waste in place	million tons	1	1	4	1	4	18	1	4	18	23	1	4	18	23	60
Total CH4 per unit SW (G)	cu ft per lb	0.64	0.64	0.64	0.64	0.64	0.66	0.64	0.64	0.66	0.68	0.64	0.64	0.66	0.68	0.68
CH4/LFG half life	years	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Max LFG gen. rate	MMCF/day	0.57		1.14			6.39				2.43					15.41
Max LFG gen. rate	scfm	397		793			4436				1685					10704
Max CH4 gen. rate	MMCF/day	0.29		0.57			3.19				1.21					7.71
Time after closure	years	0	1	0	5	4	0	6	5	1	0	12	11	7	6	0
Later LFG gen. rate	MMCF/day		0.53		0.40	0.87		0.38	0.81	5.96		0.25	0.53	3.93	1.60	
Later LFG gen. rate	scfm		370		280	601		262	561	4139		173	370	2731	1112	
Later CH4 gen. rate	MMCF/day		0.27		0.20	0.43		0.19	0.40	2.98		0.12	0.27	1.97	0.80	
Cumulative LFG gen. rate	MMCF/day	0.57	0.53	1.67	0.40	1.27	7.66	0.38	1.18	7.14	9.57	0.25	0.78	4.71	6.32	21.73
Cumulative LFG gen. rate	scfm	397	370	1163	280	882	5318	262	822	4961	6647	173	543	3274	4386	15089
LFG Condensate	gallons/day	217	202	434	153	329	2427	143	307	2265	922	94	202	1494	608	5857
Cumulative Condensate	gallons/day	217	202	636	153	482	2910	143	450	2715	3637	94	297	1791	2400	8257

NOTES:
C = calculated.
1) Environmental Solutions, Inc.
2) Condensate produced by cooling LFG at Puente Hills LF rate of 380 gal/MMCF.
Filename: 30 ktpd MRL LFG Gen/R1

TABLE B.32 (continued)
METHANE AND LANDFILL GAS GENERATION
WITH NORMAL PRECIPITATION AND 30,000 TPD

Parameter														
Years in operation	-	17	17	17	17	17	17	73	73	73	73	73	73	73
Start of Landfilling	Start: Jan 1,	1996	1997	1998	2002	2003	2009	1996	1997	1998	2002	2003	2009	2013
End of Landfilling	End: Jan 1,	1997	1998	2002	2003	2009	2013	1997	1998	2002	2003	2009	2013	2069
Duration of Landfilling	Units\Yrs>	1	1	4	1	6	4	1	1	4	1	6	4	56
Waste flowrate, max	tons per day	4,000	8,000	12,000	16,000	20,000	24,000	4,000	8,000	12,000	16,000	20,000	24,000	30,000
Waste in place	million tons	1	2	15	5	36	29	1	2	15	5	36	29	511
Cumulative waste in place	million tons	1	4	18	23	60	89	1	4	18	23	60	89	599
Total CH4 per unit SW (G)	cu ft per lb	0.64	0.64	0.66	0.68	0.68	0.68	0.64	0.64	0.66	0.68	0.68	0.68	0.68
CH4/LFG half life	years	10	10	10	10	10	10	10	10	10	10	10	10	10
Max LFG gen. rate	MMCF/day						13.16							66.56
Max LFG gen. rate	scfm						9141							46222
Max CH4 gen. rate	MMCF/day						6.58							33.28
Time after closure	years	16	15	11	10	4	0	72	71	67	66	60	56	0
Later LFG gen. rate	MMCF/day	0.19	0.40	2.98	1.21	11.68		0.00	0.01	0.06	0.03	0.24	0.27	
Later LFG gen. rate	scfm	131	280	2070	843	8112		3	6	43	17	167	189	
Later CH4 gen. rate	MMCF/day	0.09	0.20	1.49	0.61	5.84		0.00	0.00	0.03	0.01	0.12	0.14	
Cumulative LFG gen. rate	MMCF/day	0.19	0.59	3.57	4.79	16.47	29.63	0.00	0.01	0.07	0.10	0.34	0.61	67.17
Cumulative LFG gen. rate	scfm	131	411	2481	3324	11436	20577	3	8	51	69	236	425	46647
LFG Condensate	gallons/day	72	153	1133	461	4439	5002	1	3	23	10	92	103	25293
Cumulative Condensate	gallons/day	72	225	1358	1819	6258	11260	1	5	28	38	129	232	25525

TABLE B.33
METHANE AND LANDFILL GAS GENERATION AT 10,000 TPD WITH NORMAL PRECIPITATION

Parameter																					
Years in operation	-	1	2	2	6	6	6	7	7	7	7	16	16	16	16	16	85	85	85	85	85
Start of Landfilling	Start: Jan 1,	1996	1996	1997	1996	1997	1998	1996	1997	1998	2002	1996	1997	1998	2002	2003	1996	1997	1998	2002	2003
End of Landfilling	End: Jan 1,	1997	1997	1998	1997	1998	2002	1997	1998	2002	2003	1997	1998	2002	2003	2012	1997	1998	2002	2003	2081
Duration of Landfilling	Units\Yrs>	1	1	1	1	1	4	1	1	4	1	1	1	4	1	9	1	1	4	1	78
Waste flowrate, max	tons per day	4,000	4,000	8,000	4,000	8,000	10,000	4,000	8,000	10,000	10,000	4,000	8,000	10,000	10,000	10,000	4,000	8,000	10,000	10,000	10,000
Waste in place	million tons	1	1	2	1	2	12	1	2	12	3	1	2	12	3	27	1	2	12	3	237
Cumulative waste in place	million tons	1	1	4	1	4	16	1	4	16	19	1	4	16	19	46	1	4	16	19	256
Total CH4 per unit SW (G)	cu ft per lb	0.64	0.64	0.64	0.64	0.64	0.66	0.64	0.64	0.66	0.68	0.64	0.64	0.66	0.68	0.68	0.64	0.64	0.66	0.68	0.68
CH4/LFG half life	years	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Max LFG gen. rate	MMCF/day	0.57		1.14			5.32				1.52					10.51					22.55
Max LFG gen. rate	scfm	397		793			3697				1053					7300					15661
Max CH4 gen. rate	MMCF/day	0.29		0.57			2.66				0.76					5.26					11.28
Time after closure	years	0	1	0	5	4	0	6	5	1	0	15	14	10	9	0	84	83	79	78	0
Later LFG gen. rate	MMCF/day		0.53		0.40	0.87		0.38	0.81	4.97		0.20	0.43	2.66	0.81		0.00	0.00	0.02	0.01	
Later LFG gen. rate	scfm		370		280	601		262	561	3449		140	301	1849	565		1	3	15	5	
Later CH4 gen. rate	MMCF/day		0.27		0.20	0.43		0.19	0.40	2.48		0.10	0.22	1.33	0.41		0.00	0.00	0.01	0.00	
Cumulative LFG gen. rate	MMCF/day	0.57	0.53	1.67	0.40	1.27	6.59	0.38	1.18	6.15	7.67	0.20	0.63	3.30	4.11	14.62	0.00	0.01	0.03	0.03	22.59
Cumulative LFG gen. rate	scfm	397	370	1163	280	882	4578	262	822	4272	5325	140	441	2289	2854	10154	1	4	19	24	15685
LFG Condensate	gallons/day	217	202	434	153	329	2023	143	307	1887	576	77	164	1012	309	3995	1	1	8	3	8570
Cumulative Condensate	gallons/day	217	202	636	153	482	2505	143	450	2337	2914	77	241	1253	1562	5556	1	2	11	13	8583

NOTES:
C = calculated.
1) Environmental Solutions, Inc.
2) Condensate produced by cooling LFG at Puente Hills LF rate of 380 gal/MMCF.
Filename: 10KTPD MRL LFG Gen/R1

TABLE B.33 (continued)
METHANE AND LANDFILL GAS GENERATION
AT 10,000 TPD WITH NORMAL PRECIPITATION

Parameter						
Years in operation	-	100	100	100	100	100
Start of Landfilling	Start: Jan 1,	1996	1997	1998	2002	2003
End of Landfilling	End: Jan 1,	1997	1998	2002	2003	2096
Duration of Landfilling	Units\Yrs>	1	1	4	1	93
Waste flowrate, max	tons per day	4,000	8,000	10,000	10,000	10,000
Waste in place	million tons	1	2	12	3	283
Cumulative waste in place	million tons	1	4	16	19	302
Total CH4 per unit SW (G)	cu ft per lb	0.64	0.64	0.66	0.68	0.68
CH4/LFG half life	years	10	10	10	10	10
Max LFG gen. rate	MMCF/day					22.62
Max LFG gen. rate	scfm					15707
Max CH4 gen. rate	MMCF/day					11.31
Time after closure	years	99	98	94	93	0
Later LFG gen. rate	MMCF/day	0.00	0.00	0.01	0.00	
Later LFG gen. rate	scfm	0	1	5	2	
Later CH4 gen. rate	MMCF/day	0.00	0.00	0.00	0.00	
Cumulative LFG gen. rate	MMCF/day	0.00	0.00	0.01	0.01	22.63
Cumulative LFG gen. rate	scfm	0	1	7	8	15716
LFG Condensate	gallons/day	0	0	3	1	8595
Cumulative Condensate	gallons/day	0	1	4	5	8600

Table B.34: Emissions for 10,000 tons per day at Mesquite Regional Landfill and End of Year 16

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROC	Emission (lbs/day) ROC	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	10,000 tons per day	400 trips/day	32	9.66 g/mi	272	1.88 g/mi	53	1.03 g/mi	29	0.28 g/mi	8	7.41 g/mi	209	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	2.5 equip-shifts	NA	11.01 g/hp/hr	138	1.01 g/hp/hr	13	0.90 g/hp/hr	11	0.19 g/hp/hr	2	4.60 g/hp/hr	58	3)
Container truck engines	At LATC	NA	10,000 tons per day	400 trips/day	1	9.66 g/mi	9	1.88 g/mi	2	1.03 g/mi	1	0.28 g/mi	0	7.41 g/mi	7	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	2.5 equip-shifts	NA	14.00 g/hp/hr	15	1.12 g/hp/hr	1	1.00 g/hp/hr	1	0.19 g/hp/hr	0	3.03 g/hp/hr	3	5)
Light-duty std PU truck (gasoline) engines	At LATC	NA	6 trips/equip-shift	2.5 equip-shifts	2	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC	NA	3 trips/equip-shift	2.5 equip-shifts	2	9.66 g/mi	0	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	10,000 tons per day	2.5 train/day	432		3616		163		108		79		508	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL	Air in ICAPCD	NA	150 employees	90	0.59 g/mi	18	0.07 g/mi	2	0.01 g/mi	0.30	0.05 g/mi	1.49	1.98 g/mi	59	9)
LFG generated (100%)	At MRL	in ICAPCD	MMCF/day	15	NA											
LFG fugitive (Escape percent =)	20%	Air in ICAPCD	MMCF/day	3	NA			27.3 lb/MMCF	80							10)
LFG flared (Collection percent =)	80%	Air in ICAPCD	MMCF/day	12	NA	0.062 lb/MMBTU	363	0.010 lb/MMBTU	58	0.025 lb/MMBTU	146	0.012 lb/MMBTU	70	0.010 lb/MMBTU	58	11)
Container truck engines	35 Truck Speed (MPH)	Air in ICAPCD	10,000 tons per day	400 trips/day	2.51	9.66 g/mi	21	1.88 g/mi	4	1.03 g/mi	2	0.28 g/mi	1	7.41 g/mi	16	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	6	0.0357 lb/hr	8	0.0000	0	0.0000	0	0.0953 lb/hr	20	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	2.5 equip-shifts	NA	5.80 g/hp/hr	73	1.01 g/hp/hr	13	0.16 g/hp/hr	2	0.19 g/hp/hr	2	4.60 g/hp/hr	58	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	2.5 equip-shifts	NA	5.80 g/hp/hr	151	0.75 g/hp/hr	20	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.15 g/hp/hr	56	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	2.5 equip-shifts	NA	5.80 g/hp/hr	129	1.76 g/hp/hr	39	0.16 g/hp/hr	4	0.17 g/hp/hr	4	7.34 g/hp/hr	163	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	2.5 equip-shifts	NA	5.80 g/hp/hr	84	0.75 g/hp/hr	11	0.16 g/hp/hr	2	0.17 g/hp/hr	2	2.15 g/hp/hr	31	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	2.5 equip-shifts	NA	5.80 g/hp/hr	46	1 g/hp/hr	8	0.16 g/hp/hr	1	0.18 g/hp/hr	1	8.50 g/hp/hr	67	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	2.5 equip-shifts	NA	14.00 g/hp/hr	15	1.12 g/hp/hr	1.23	1.00 g/hp/hr	1.10	0.19 g/hp/hr	0.21	3.03 g/hp/hr	3	5)
Light-duty std PU truck (gasoline) engines	0	Air in ICAPCD	6 trips/equip-shift	30 trucks	2.51	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	2	6)
Medium/heavy-duty truck (diesel) engines	0	Air in ICAPCD	3 trips/equip-shift	16 trucks	2.51	9.66 g/mi	3	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	2	7)
Fueling area evaporation	0	Air in ICAPCD	NA	NA	NA			0.82 lb/dy/4000tpd	2							14)
Fugitive dust / unpaved	BACT(%) = 95		10,000	400	0.0528					1.76	2					15)
roads / container trucks	BACT(%) = 90		tons per day	400	0.0528					0.44	0.9					16)
Fugitive dust / unpaved	BACT(%) = 95		12,590	315	0.0528					0.98	0.8					15)
roads / cover haul trucks	BACT(%) = 90		tons per day	315	0.0528					0.24	0.4					16)
Fugitive dust / paved roads / container trucks	0 BACT(%) = 75	Air in ICAPCD	10,000 tons per day	400	2.51					0.13 lbs/VMT	32					17)
Fugitive dust / paved roads / cover haul trucks	0 BACT(%) = 75	Air in ICAPCD	12,590 tons per day	315	1.92					0.13 lbs/VMT	19					17)
Fugitive dust from landfill equipment	0 BACT(%) = 90	Air in ICAPCD	0.32 ac/dy/4000tpd	2.5	NA					17.52 lbs/acre/day	1					18)
Wind erosion	0 BACT(%) = 90	Air in ICAPCD	3 ac/dy/4000tpd	2.5	NA					0.62 lbs/acre/day	0					19)
Totals							5474		551		385		192		1793	
Subtotal in SOCAB							1740		127		81		39		460	20)
Subtotal in Coachella							1339		60		40		29		188	20)
Subtotal in ICAPCD							2394		364		264		124		1145	20)
Subtotal at Site							1406		318		235		101		950	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factora, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor. Cranes = track-type tractor. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1993 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991.
7) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments, linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%. NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees and service/supply vehicles drive 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe. Assume number of carpooling vehicles plus service/supply vehicles = total employment. EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.)
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991, as published in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LFG.
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 20 mph.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8% and 10 mph.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with road surf loading set to 20 lb/mi.
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT. USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 58 miles in ICAPCD.
Filename: MRL 16F/10ktpd
Date: 15-Oct-93

Table B.35: Emissions for 10,000 tpd at Chocolate Mountain Landfill and End of Year 16

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	10,000 tons per day	400 trips/day	32	9.66 g/mi	272	1.88 g/mi	53	1.03 g/mi	29	0.28 g/mi	8	7.41 g/mi	209	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	2.5 equip-shifts	NA	11.01 g/hp/hr	138	1.01 g/hp/hr	13	0.90 g/hp/hr	11	0.19 g/hp/hr	2	4.60 g/hp/hr	58	3)
Container truck engines	At LATC		10,000 tons per day	400 trips/day	1	9.66 g/mi	9	1.88 g/mi	2	1.03 g/mi	1	0.28 g/mi	0	7.41 g/mi	7	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	2.5 equip-shifts	NA	14.00 g/hp/hr	15	1.12 g/hp/hr	1	1.00 g/hp/hr	1	0.19 g/hp/hr	0	3.03 g/hp/hr	3	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shif	2.5 equip-shifts	2	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shif	2.5 equip-shifts	2	9.66 g/mi	0	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	10,000 tons per day	2.5 train/day	390		3264		147		97		71		458	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			150 employees	90	0.59 g/mi	18	0.07 g/mi	2	0.01 g/mi	0.30	0.05 g/mi	1.49	1.98 g/mi	59	9)
LFG generated (100%)			MMCF/day	15												
LFG fugitive (Escape percent =)	20%	Air in ICAPCD	MMCF/day	3				27.4 lb/MMCF	80							10)
LFG flared (Collection percent =)	80%	Air in ICAPCD	MMCF/day	12		0.062 lb/MMBTU	363	0.01 lb/MMBTU	58	0.025 lb/MMBTU	146	0.012 lb/MMBTU	70	0.01 lb/MMBTU	58	11)
Container truck engines	35 Truck speed (MPH)		10,000 tons per day	400	2.51	9.66 g/mi	21	1.88 g/mi	4	1.03 g/mi	2	0.28 g/mi	1	7.41 g/mi	16	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	6	0.0357 g/hp/hr	8	0.0000	0	0.0000	0	0.0953 g/hp/hr	20	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	2.5 equip-shifts	NA	5.80 g/hp/hr	73	1.01 g/hp/hr	13	0.16 g/hp/hr	2	0.19 g/hp/hr	2	4.60 g/hp/hr	58	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	2.5 equip-shifts	NA	5.80 g/hp/hr	151	0.75 g/hp/hr	20	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.15 g/hp/hr	56	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	2.5 equip-shifts	NA	5.80 g/hp/hr	129	1.76 g/hp/hr	39	0.16 g/hp/hr	4	0.17 g/hp/hr	4	7.34 g/hp/hr	163	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	2.5 equip-shifts	NA	5.80 g/hp/hr	84	0.75 g/hp/hr	11	0.16 g/hp/hr	2	0.17 g/hp/hr	2	2.15 g/hp/hr	31	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	2.5 equip-shifts	NA	5.80 g/hp/hr	46	1 g/hp/hr	8	0.16 g/hp/hr	1	0.18 g/hp/hr	1	8.50 g/hp/hr	67	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	2.5 equip-shifts	NA	14.00 g/hp/hr	15	1.12 g/hp/hr	1	1.00 g/hp/hr	1	0.19 g/hp/hr	0.2	3.03 g/hp/hr	3	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shif	30 trucks	2.51	0.32 g/mi	0	0.11 g/mi	0.1	0.01 g/mi	0.0	0.05 g/mi	0	2.28 g/mi	2	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shif	16 trucks	2.51	9.66 g/mi	3	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	2	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	2							14)
Fugitive dust / unpaved roads / container trucks	BACT(%) =	95	10,000 tons per day	400	0.0528					1.76	2					15)
	BACT(%) =	90		400	0.0528					0.44	0.9					16)
Fugitive dust / unpaved roads / cover haul trucks	BACT(%) =	95	6,350 tons per day	159	0.0528					0.98	0.4					15)
	BACT(%) =	90		159	0.0528					0.24	0.2					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	10,000 tons per day	400	2.51					0.13 lbs/VMT	32					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	6,350 tons per day	159	1.92					0.13 lbs/VMT	10					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	2.5	NA					18 lbs/acre/day	1					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	2.5	NA					0.62 lbs/acre/day	0					19)
Totals							5122		536		364		184		1744	
Subtotal in SOCAB							1740		127		81		39		460	20)
Subtotal in Coachella							1339		60		40		29		188	20)
Subtotal in ICAPCD							2043		348		243		116		1096	20)
Subtotal at Site							1406		318		224		101		950	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor.
Cranes = EPA miscellaneous heavy-duty construction equipment. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1992 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1992 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
7) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments,
linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees will drive an average of 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe to work at MRL.
EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991,
as published in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LF(
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8%, 20 mph and BACT = 95%.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8%, 10 mph and BACT = 90%.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with
road surf loading set to 0.011 oz/sq yd (20 lb/mi).
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 37 miles in ICAPCD.
Filename: CML 10KTPD F
Date: 15-Oct-93

Table B.36: Emissions for 10,000 tpd at Eagle Mountain Landfill and End of Year 16

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	10,000 tons per day	400 trips/day	32	9.66 g/mi	272	1.88 g/mi	53	1.03 g/mi	29	0.28 g/mi	8	7.41 g/mi	209	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	2.5 equip-shifts	NA	11.01 g/hp/hr	138	1.01 g/hp/hr	13	0.90 g/hp/hr	11	0.19 g/hp/hr	2	4.60 g/hp/hr	58	3)
Container truck engines	At LATC		10,000 tons per day	400 trips/day	1	9.66 g/mi	9	1.88 g/mi	2	1.03 g/mi	1	0.28 g/mi	0	7.41 g/mi	7	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	2.5 equip-shifts	NA	14.00 g/hp/hr	15	1.12 g/hp/hr	1	1.00 g/hp/hr	1	0.19 g/hp/hr	0	3.03 g/hp/hr	3	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shif	2.5 equip-shifts	2	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shif	2.5 equip-shifts	2	9.66 g/mi	0	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	10,000 tons per day	2.5 train/day	400		3348		150		100		73		470	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			150 employees	90	0.59 g/mi	18	0.07 g/mi	2	0.01 g/mi	0.30	0.05 g/mi	1.49	1.98 g/mi	59	9)
LFG generated (100%)			MMCF/day	15												
LFG fugitive (Escape percent =)	20%	Air in ICAPCD	MMCF/day	3				27.4 lb/MMCF	80							10)
LFG flared (Collection percent =)	80%	Air in ICAPCD	MMCF/day	12		0.062 lb/MMBTU	363	0.01 lb/MMBTU	58	0.025 lb/MMBTU	146	0.012 lb/MMBTU	70	0.01 lb/MMBTU	58	11)
Container truck engines	35 Truck speed (MPH)		10,000 tons per day	400	2.51	9.66 g/mi	21	1.88 g/mi	4	1.03 g/mi	2	0.28 g/mi	1	7.41 g/mi	16	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	6	0.0357 g/hp/hr	8	0.0000	0	0.0000	0	0.0953 g/hp/hr	20	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	2.5 equip-shifts	NA	5.80 g/hp/hr	73	1.01 g/hp/hr	13	0.16 g/hp/hr	2	0.19 g/hp/hr	2	4.60 g/hp/hr	58	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	2.5 equip-shifts	NA	5.80 g/hp/hr	151	0.75 g/hp/hr	20	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.15 g/hp/hr	56	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	2.5 equip-shifts	NA	5.80 g/hp/hr	129	1.76 g/hp/hr	39	0.16 g/hp/hr	4	0.17 g/hp/hr	4	7.34 g/hp/hr	163	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	2.5 equip-shifts	NA	5.80 g/hp/hr	84	0.75 g/hp/hr	11	0.16 g/hp/hr	2	0.17 g/hp/hr	2	2.15 g/hp/hr	31	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	2.5 equip-shifts	NA	5.80 g/hp/hr	46	1 g/hp/hr	8	0.16 g/hp/hr	1	0.18 g/hp/hr	1	8.50 g/hp/hr	67	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	2.5 equip-shifts	NA	14.00 g/hp/hr	15	1.12 g/hp/hr	1	1.00 g/hp/hr	1	0.19 g/hp/hr	0.2	3.03 g/hp/hr	3	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shif	30 trucks	2.51	0.32 g/mi	0	0.11 g/mi	0.1	0.01 g/mi	0.0	0.05 g/mi	0	2.28 g/mi	2	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shif	16 trucks	2.51	9.66 g/mi	3	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	2	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	2							14)
Fugitive dust / unpaved roads / container trucks	BACT(%) = 95		10,000 tons per day	400	0.0528					1.76	2					15)
	BACT(%) = 90			400	0.0528					0.44	0.9					16)
Fugitive dust / unpaved roads / cover haul trucks	BACT(%) = 95		6,350 tons per day	159	0.0528					0.98	0.4					15)
	BACT(%) = 90			159	0.0528					0.24	0.2					16)
Fugitive dust / paved roads / container trucks	BACT(%) = 75		10,000 tons per day	400	2.51					0.13 lbs/VMT	32					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) = 75		6,350 tons per day	159	1.92					0.13 lbs/VMT	10					17)
Fugitive dust from landfill equipment	BACT(%) = 90		0.32 ac/dy/4000tpd	2.5	NA					18 lbs/acre/day	1					18)
Wind erosion	BACT(%) = 90		3 ac/dy/4000tpd	2.5	NA					0.62 lbs/acre/day	0					19)
Totals							5206		540		367		186		1756	
Subtotal in SOCAB							1740		127		81		39		460	20)
Subtotal in Coachella							1348		61		40		30		217	20)
Subtotal in RC/non-Coa							2118		351		246		117		1078	20)
Subtotal at Site							1406		318		224		101		950	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor.
Cranes = EPA miscellaneous heavy-duty construction equipment. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1992 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1992 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
7) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments,
linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees will drive an average of 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe to work at MRL.
EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991,
as published in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LF(
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8%, 20 mph and BACT = 95%.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8%, 10 mph and BACT = 90%.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with
road surf loading set to 0.011 oz/sq yd (20 lb/mi).
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 42 miles in Riverside /Countyeast of Coachella Valley.
Filename: EML 10KTPD F
Date: 15-Oct-93

Table B.37: Emissions for 20,000 tpd at Eagle Mountain Landfill and End of Year 16

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	20,000 tons per day	800 trips/day	32	9.66 g/mi	544	1.88 g/mi	106	1.03 g/mi	58	0.28 g/mi	16	7.41 g/mi	417	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	5 equip-shifts	NA	11.01 g/hp/hr	277	1.01 g/hp/hr	25	0.90 g/hp/hr	23	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
Container truck engines	At LATC		20,000 tons per day	800 trips/day	1	9.66 g/mi	17	1.88 g/mi	3	1.03 g/mi	2	0.28 g/mi	0	7.41 g/mi	13	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shif	5 equip-shifts	2	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shif	5 equip-shifts	2	9.66 g/mi	1	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	20,000 tons per day	5 train/day	400		6695		301		199		145		940	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			268 employees	90	0.59 g/mi	32	0.07 g/mi	4	0.01 g/mi	0.53	0.05 g/mi	2.66	1.98 g/mi	105	9)
LFG generated (100%)			MMCF/day	26												
LFG fugitive (Escape percent =)	20%	Air in ICAPCD	MMCF/day	5				27.4 lb/MMCF	143							10)
LFG flared (Collection percent =)	80%	Air in ICAPCD	MMCF/day	21		0.062 lb/MMBTU	649	0.01 lb/MMBTU	105	0.025 lb/MMBTU	262	0.012 lb/MMBTU	126	0.01 lb/MMBTU	105	11)
Container truck engines	35 Truck speed (MPH)		20,000 tons per day	800	2.51	9.66 g/mi	43	1.88 g/mi	8	1.03 g/mi	5	0.28 g/mi	1	7.41 g/mi	33	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	12	0.0357 g/hp/hr	15	0.0000	0	0.0000	0	0.0953 g/hp/hr	40	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	146	1.01 g/hp/hr	25	0.16 g/hp/hr	4	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	303	0.75 g/hp/hr	39	0.16 g/hp/hr	8	0.17 g/hp/hr	9	2.15 g/hp/hr	112	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	258	1.76 g/hp/hr	78	0.16 g/hp/hr	7	0.17 g/hp/hr	8	7.34 g/hp/hr	326	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	169	0.75 g/hp/hr	22	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	63	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	92	1 g/hp/hr	16	0.16 g/hp/hr	3	0.18 g/hp/hr	3	8.50 g/hp/hr	135	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.4	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shif	30 trucks	2.51	0.32 g/mi	0	0.11 g/mi	0.1	0.01 g/mi	0.0	0.05 g/mi	0	2.28 g/mi	2	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shif	16 trucks	2.51	9.66 g/mi	3	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	2	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	4							14)
Fugitive dust / unpaved	BACT(%) =	95	20,000	800	0.0528					1.76	4					15)
roads / container trucks	BACT(%) =	90	tons per day	800	0.0528					0.44	1.9					16)
Fugitive dust / unpaved	BACT(%) =	95	8,807	220	0.0528					0.98	0.6					15)
roads / cover haul trucks	BACT(%) =	90	tons per day	220	0.0528					0.24	0.3					16)
Fugitive dust / paved roads / container trucks	BACT(%) =	75	20,000 tons per day	800	2.51					0.13 lbs/VMT	64					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) =	75	8,807 tons per day	220	1.92					0.13 lbs/VMT	14					17)
Fugitive dust from landfill equipment	BACT(%) =	90	0.32 ac/dy/4000tpd	5	NA					18 lbs/acre/day	3					18)
Wind erosion	BACT(%) =	90	3 ac/dy/4000tpd	5	NA					0.62 lbs/acre/day	1					19)
Totals							9815		975		682		341		3011	
Subtotal in SOCAB							3481		255		163		78		920	20)
Subtotal in Coachella							2694		122		80		59		429	20)
Subtotal in RC/non-Coa							3640		598		439		204		1662	20)
Subtotal at Site							2218		533		397		172		1412	

Notes:
NA = Not applicable

1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor. Cranes = EPA miscellaneous heavy-duty construction equipment. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1992 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1992 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
7) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments, linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%. NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees will drive an average of 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe to work at MRL. EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991, as published in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LF(
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8%, 20 mph and BACT = 95%.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8%, 10 mph and BACT = 90%.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with road surf loading set to 0.011 oz/sq yd (20 lb/mi).
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT. USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 42 miles in Riverside /Countyeast of Coachella Valley.

Filename: EML 20KTPD F
Date: 15-Oct-93

Table B.38: Emissions for 20,000 tpd at Chocolate Mountain Landfill and End of Year 16

Source	Condition 1	Condition 2	Amount	No. units	Roundtrip Distance (miles)	Emission Factor NOx	Emission (lbs/day) NOx	Emission Factor ROG	Emission (lbs/day) ROG	Emission Factor PM-10	Emission (lbs/day) PM-10	Emission Factor SOx	Emission (lbs/day) SOx	Emission Factor CO	Emission (lbs/day) CO	Ref.
Container truck engines	From transfer stations in SCAQMD	To LATC in SCAQMD	20,000 tons per day	800 trips/day	32	9.66 g/mi	544	1.88 g/mi	106	1.03 g/mi	58	0.28 g/mi	16	7.41 g/mi	417	1) 2)
Cranes at LATC	285 hp	1 Load factor at LATC	8 hrs/equip-shift	5 equip-shifts	NA	11.01 g/hp/hr	277	1.01 g/hp/hr	25	0.90 g/hp/hr	23	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
Container truck engines	At LATC		20,000 tons per day	800 trips/day	1	9.66 g/mi	17	1.88 g/mi	3	1.03 g/mi	2	0.28 g/mi	0	7.41 g/mi	13	4)
Fork Lifts (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines	At LATC		6 trips/equip-shif	5 equip-shifts	2	0.32 g/mi	0	0.11 g/mi	0	0.01 g/mi	0	0.05 g/mi	0	2.28 g/mi	0	6)
Medium/heavy-duty truck (diesel) engines	At LATC		3 trips/equip-shif	5 equip-shifts	2	9.66 g/mi	1	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	0	7)
Trains (by notch)	From LATC in SCAQMD	To MRL in ICAPCD	20,000 tons per day	5 train/day	390		6528		293		194		142		916	8)
Light-duty std vehicle (gasoline) engines	Employees commuting to MRL			268 employees	90	0.59 g/mi	31	0.07 g/mi	4	0.01 g/mi	0.53	0.05 g/mi	2.66	1.98 g/mi	105	9)
LFG generated (100%)			MMCF/day	26												
LFG fugitive (Escape percent =)	20%	Air in ICAPCD	MMCF/day	5				27.4 lb/MMCF	143							10)
LFG flared (Collection percent =)	80%	Air in ICAPCD	MMCF/day	21		0.062 lb/MMBTU	649	0.01 lb/MMBTU	105	0.025 lb/MMBTU	262	0.012 lb/MMBTU	126	0.01 lb/MMBTU	105	11)
Container truck engines	35 Truck speed (MPH)		20,000 tons per day	800	2.51	9.66 g/mi	43	1.88 g/mi	8	1.03 g/mi	5	0.28 g/mi	1	7.41 g/mi	33	4)
Idling emissions			7 hrs/truck/day	12 tractors/shift	NA	0.0291 lb/hr	12	0.0357 g/hp/hr	15	0.0000	0	0.0000	0	0.0953 g/hp/hr	40	12) 13)
Cranes	285 hp	1 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	146	1.01 g/hp/hr	25	0.16 g/hp/hr	4	0.19 g/hp/hr	5	4.60 g/hp/hr	116	3)
D9 dozer engines	370 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	303	0.75 g/hp/hr	39	0.16 g/hp/hr	8	0.17 g/hp/hr	9	2.15 g/hp/hr	112	3)
826C compactor engines	315 hp	0.8 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	258	1.76 g/hp/hr	78	0.16 g/hp/hr	7	0.17 g/hp/hr	8	7.34 g/hp/hr	326	3)
Tipper engines	165 hp	1 load factor	16 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	169	0.75 g/hp/hr	22	0.16 g/hp/hr	5	0.17 g/hp/hr	5	2.15 g/hp/hr	63	3)
769C 40 ton end dump truck engines	450 hp	0.4 load factor	16 hrs/equip-shift	7 trucks	NA	5.80 g/hp/hr	258	1 g/hp/hr	44	0.16 g/hp/hr	7	0.18 g/hp/hr	8	8.50 g/hp/hr	378	3)
769C 40 ton water truck engines	450 hp	0.4 load factor	8 hrs/equip-shift	5 equip-shifts	NA	5.80 g/hp/hr	92	1 g/hp/hr	16	0.16 g/hp/hr	3	0.18 g/hp/hr	3	8.50 g/hp/hr	135	3)
16G grader engine	275 hp	0.5 load factor	18 hrs/day/grader	4 graders	NA	5.80 g/hp/hr	127	0.36 g/hp/hr	8	0.16 g/hp/hr	3	0.17 g/hp/hr	4	1.54 g/hp/hr	34	3)
988B loader engine	375 hp	0.6 load factor	15 hrs/day/grader	3 loaders	NA	5.80 g/hp/hr	129	0.97 g/hp/hr	22	0.16 g/hp/hr	4	0.17 g/hp/hr	4	2.71 g/hp/hr	60	3)
Fork lift (2 ton) engines (diesel)	100 hp	0.5 load factor	4 hrs/equip-shift	5 equip-shifts	NA	14.00 g/hp/hr	31	1.12 g/hp/hr	2	1.00 g/hp/hr	2	0.19 g/hp/hr	0.4	3.03 g/hp/hr	7	5)
Light-duty std PU truck (gasoline) engines			6 trips/equip-shif	30 trucks	2.51	0.32 g/mi	0	0.11 g/mi	0.1	0.01 g/mi	0.0	0.05 g/mi	0	2.28 g/mi	2	6)
Medium/heavy-duty truck (diesel) engines			3 trips/equip-shif	16 trucks	2.51	9.66 g/mi	3	1.88 g/mi	0	1.03 g/mi	0	0.28 g/mi	0	7.41 g/mi	2	7)
Fueling area evaporation								0.82 lb/dy/4000tpd	4							14)
Fugitive dust / unpaved roads / container trucks	BACT(%) = 95		20,000 tons per day	800	0.0528					1.76	4					15)
	BACT(%) = 90			800	0.0528					0.44	1.9					16)
Fugitive dust / unpaved roads / cover haul trucks	BACT(%) = 95		8,807 tons per day	220	0.0528					0.98	0.6					15)
	BACT(%) = 90			220	0.0528					0.24	0.3					16)
Fugitive dust / paved roads / container trucks	BACT(%) = 75		20,000 tons per day	800	2.51					0.13 lbs/VMT	64					17)
Fugitive dust / paved roads / cover haul trucks	BACT(%) = 75		8,807 tons per day	220	1.92					0.13 lbs/VMT	14					17)
Fugitive dust from landfill equipment	BACT(%) = 90		0.32 ac/dy/4000tpd	5	NA					18 lbs/acre/day	3					18)
Wind erosion	BACT(%) = 90		3 ac/dy/4000tpd	5	NA					0.62 lbs/acre/day	1					19)
Totals							9647		967		677		338		2987	
Subtotal in SOCAB							3481		255		163		78		920	20)
Subtotal in Coachella							2678		120		80		58		376	20)
Subtotal in ICAPCD							3488		592		435		201		1691	20)
Subtotal at Site							2218		533		397		172		1412	

Notes:
NA = Not applicable
1) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L.
2) Container truck holds 25 tons MSW. Transfer/compactor stations in heart of Los Angeles are 16 miles from intermodal station(s) in Los Angeles.
3) USEPA, 1985, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB87-205266, Section II-7: Heavy-duty construction equipment, Table II-7.1. Compactor = wheeled tractor. Dozer = track-type tractor.
Cranes = EPA miscellaneous heavy-duty construction equipment. SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1992 under 1990 CAAA.
4) CARB, 1991, EMFAC7EP at 75F for 2010 heavy duty diesel trucks at 35mph. These factors are higher than those from USEPA (1991). SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
5) USEPA, 1985, Compilation of air pollutant emission factors, Volume I, Stationary point and sources (4th Edition), PB86-124906, Part 1 of 2, Section 3.3: Gasoline and Diesel Industrial Engines, Table 3.3-1.
SOx EF divided by 5 because diesel fuel S being reduced from 0.25% to 0.05% by Oct 3, 1992 under 1990 CAAA.
6) EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. SOx factor is from the CEQA Air Quality Handbook, SCAQMD, 1993, Appendix to Chapter 9, Table A9-5-L
7) EMFAC7EP emission factors for medium duty trucks in 2010 at 75F and 35mph (CARB run 1/24/1991. Same as for heavy duty trucks.
8) Time in notch settings taken from Appendix of Booz•Allen & Hamilton Inc., 1991, Locomotive emission study, report to California Air Resources Board, p. B-17, 78 mile long LA to Beaumont and reverse segments,
linearly adjusted for actual distances. Locomotive emission factors taken from Appendix of Ref. 2, p. B-10 for Southern Pacific line haul locomotives. SOx emission factor 1/5 Booz Allen factor for S in fuel reduced from 0.25 to 0.05%.
NOx reduced 30% by retrofit controls (Engine, Fuel, and Emissions Engineering, 1992, Evaluation of emission controls for locomotives: technology screening report (to CARB)), preliminary draft, January 3; Booz•Allen & Hamilton, 1991).
9) Employees will drive an average of 90 mi. round trip from El Centro, Brawley, Yuma, and Blythe to work at MRL.
EMFAC7EP emission factors for light duty trucks in 2010 at 75F and 55mph (CARB run 1/24/1991.
10) Assumes 20% landfill gas generated diffuses through the surface and 80% is collected. EF based on Puente Hills Landfill SCAQMD Rule 1150.1 Gas Composition data from 1991,
as published in the Draft EIR for Puente Hill, May 1992.
11) Emission factors for Puente Hills flares as tested by Carnot in 1990 and reported by County Sanitation Districts of Los Angeles County in September 20, 1991 letter from Donald S. Nellor to BLM on Eagle Mt. Assume 500MMBTU/MMcu ft LF(
12) Idling time per truck tractor per shift per day = Shift length - (# trips per day x Rd trip dist./Speed/# truck tractors per equip. shift/# shifts per day).
13) USEPA, 1991, Compilation of air pollutant emission factors, Volume II, Mobile sources (4th Edition), PB91-167692, Table 1.7.3, assuming model year 1985+ and 50,000 miles driven.
14) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 4.3: Storage of organic liquids.
15) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8%, 20 mph and BACT = 95%.
16) State of Wyoming, 1979, Department of Environmental Quality. Unpaved roads with silt = 8%, 10 mph and BACT = 90%.
17) USEPA, 1985, Compilation of air pollutant emission factors, Vol I: Stationary point and area sources (4th Ed), PB86-124906, Sec 11.2.6: Industrial paved road equation with
road surf loading set to 0.011 oz/sq yd (20 lb/mi).
18) USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.4: Heavy construction operations.
19) Assumes silt content = 1.6%, 0 precip. days, 21.9% TSP = PM10, before BACT.
USEPA, 1985, Compilation of air pollutant emission factors, Volume I: Stationary point and area sources (4th Edition), PB86-124906, Section 11.2.3: Miscellaneous Sources.
20) Trains run 78 miles in SOCAB, 80 miles in Coachella Valley, and 37 miles in ICAPCD.
Filename: CML 20KTPD F
Date: 15-Oct-93

91-296

APPENDIX C

ANALYSIS OF OFFSETS FOR STATIONARY POINT SOURCES AT THE PROPOSED MESQUITE REGIONAL LANDFILL

Prepared for:
Arid Operations Inc.

Prepared by:
Environmental Solutions, Inc.

March, 1994

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1.0 INTRODUCTION

1. This analysis of offsets is prepared for the proposed Mesquite Regional Landfill in response to questions raised by the Bureau of Land Management, Imperial County Planning Department and Imperial County Air Pollution Control District (ICAPCD).

2. The regulatory background is presented first because it provides an understanding of the air quality control responsibilities of Federal, State, and local agencies, and places offsets in a context of air quality controls and mitigation measures. The offsets from two different potential sources, the Mesquite Mine and agricultural burning, are described. Excess emission reductions that would be created by these two sources are also described.

2.0 AIR QUALITY CONTROL REGULATORY REQUIREMENTS

1. This chapter will describe how air quality control authority and regulatory requirements flow from the initial legislation through different levels of government, and how different kinds of emissions are regulated by different approaches and agencies.

2. The Clean Air Act of 1970, as amended in 1990, is the basic legislation that controls air quality. The two parts, called titles, that are most important for the proposed landfill are Title I, provisions to control stationary sources in areas that are nonattainment of National Ambient Air Quality Standards (NAAQS), and Title II, provisions to control mobile sources.

3. Congress authorized the Environmental Protection Agency (EPA) to promulgate regulations and administer air quality control programs. EPA retained authority to regulate mobile sources, except to allow the California Air Resources Board (CARB) similar authority to set tailpipe emission standards that are more restrictive.

4. EPA delegated authority to the states and local jurisdictions to regulate stationary sources. In California, CARB delegated this authority to local Air Pollution Control Districts (APCDs) and Air Quality Management Districts (AQMDs). EPA required that each final jurisdiction develop rules and regulations to review proposed new and modified sources of nonattainment pollutants and precursors.

5. ICAPCD developed their New and Modified Stationary Source Review Rule 207 after more than a year of public workshops and hearings. This process provided opportunity for citizens, businesses, and government agencies to comment and improve the revised rule. The final rule was adopted by the Imperial County Air Pollution Control Board on September 7, 1993, and contains provisions for offsets of emissions of nonattainment pollutants and precursors above a threshold emission rate.

6. In Imperial County, ozone and particulate matter with aerodynamic diameter greater than 10 microns (PM_{10}) are nonattainment of California Ambient Air Quality Standards (CAAQS) and PM_{10} is also nonattainment of NAAQS (see Table 1.1). Precursors of ozone are nitrogen oxides (NO_x) and reactive organic gases (ROG), while precursors of PM_{10} include the same NO_x and ROG along with sulfur oxides (SO_x).

7. The threshold in Rule 207 is 137 pounds per day for the emissions of each pollutant category from stationary point sources, above which offsets must be provided. An offset ratio is applied according to the distance of the source of offsetting emission reductions.

8. Rule 207 also requires that Best Available Control Technology (BACT) be applied to stationary sources and that the modeled ground-level concentrations of criteria pollutants at and beyond the property boundary do not cause the following:
   - Violation of CAAQS, including visibility-reducing particles, or NAAQS, whichever is strictest.
   - Substantial contribution to an existing or projected violation of CAAQS or NAAQS.
   - Increase in the frequency of an existing violation of a CAAQS or NAAQS.
   - Substantial contribution to a delay in attainment of a CAAQS or NAAQS according to a CARB-approved Air Quality Attainment Plan (AQAP).
   - Determination that the emissions are inconsistent with a CARB-approved AQAP, including visibility protection.

9. Health risk was assessed and showed that the emissions from the proposed landfill would not cause carcinogenic, acute, or chronic risks to exceed levels set by the South Coast Air Quality Management District (SCAQMD).

10. EPA imposed a new limit of 0.05 percent for the sulfur content in diesel fuel sold throughout the nation after October 3, 1993. EPA's (and CARB's) tailpipe emission standards will become increasingly strict over the years, and will reduce the emissions from mobile equipment used at the landfill.

11. Attainment pollutants are regulated by the Prevention of Significant Deterioration (PSD) program to assure that clean areas of the nation are not degraded beyond specified increments. This program does not apply to the proposed landfill because the emission rate of each attainment pollutant (NO_2, SO_2, and CO) would be less than the threshold of 250 tons per year.

3.0 OFFSET REQUIREMENTS

1. This chapter will describe the offsets required by Rule 207, the potential sources of offsets, and the emission balance benefits to Imperial County of the proposed offset plan.

2. The Clean Air Act and the resulting Rule 207 require offsets of stationary point source emissions of nonattainment pollutants and precursors above the 137 pound per day threshold.

3. The proposed offset sources are the adjacent Mesquite Mine when it reduces operations and emissions over the period of 1997 through 2007, and the reduction of emissions from burning agricultural plant material. Offsets will not be needed until the fifth year of operation as shown in Table C.1 and in the emission inventories in Appendix B.

4. An offset ratio of 1.2 must be applied to emission offsets obtained from these sources because they are located within 50 miles of the Proposed Action.

5. Satisfying the landfill offset requirements will cause different emission reductions according to the source of offsets. The following analysis is separated into two parts by source, and emission balances are provided for each.

3.1 MESQUITE MINE OFFSETS

1. The mine emission offsets would only be available for a limited time period that extends from approximately the third year, through the fourteenth year of the landfill. This period is based on the expected pace of the mine reduction of emissions which can be seen in Figures 6.1 through 6.5, and on the fact that the reduction in any year is equal to the difference between the expected emission rate and the arithmetic mean of the three previous years.

2. As examples of the program, we analyze the emission balance for the tenth and hundredth years. The tenth year is after the disposal has reached its maximum rate of 20,000 tons, and while the LFG thermal destruction system utilizes flares. The hundredth year is the end of the disposal period for the landfill and when LFG is generated and collected at maximum rates.

3. Table C.2 shows the emission rates of the four nonattainment pollutants and their precursors on both a daily and annual basis. After subtracting the Rule 207 threshold emission rate, the remaining emissions to be offset are multiplied by the offset ratio of 1.2 to obtain the offset requirement. The available Mesquite Mine offsets are calculated from the data in Figures 6.1 through 6.4 by subtracting the mine emissions projected for the tenth year from the arithmetic mean of the three previous years. Because of the constant linear slope of the projected mine emissions, the difference in emission rates happens to work out to be one-fifth of the total decrease in mine emissions (e.g., 834 pounds per day of NO_x).

4. The excess emissions reductions or excess offsets are calculated by subtracting the available offsets from the offset requirement. The calculations in Table C.2 are shown graphically in Figure C.1. The mine provides excess reductions for all four pollutants.

5. For comparison, fugitive ROG from LFG that might potentially escape from the landfill surface and fugitive PM_{10} are also shown in Figure C.1. Because NO_x and ROG are companion precursors of ozone, the combined excess reductions are over 5 times larger than the fugitive ROG emissions.

3.2 AGRICULTURAL OFFSETS

1. The calculation of the offset requirement for the landfill stationary source (flare) is the same for agricultural offsets as can be seen by comparing Tables C.2 and C.3.

2. The agricultural burning offset factors used in Table C.3 are taken from Table 6.10. The NO_x emissions to be offset determine how much agricultural plant material needs to be diverted from burning because the NO_x emission factor is lower than the ROG, PM_{10} and SO_x emission factors. Hence, no NO_x excess reductions occur when agriculture would supply offsets.

3. Excess emissions reductions would occur for ROG and PM_{10} as shown in Table C.3 and Figure C.2. Fugitive ROG and PM_{10} emission rates are also shown for comparison. The excess reductions are approximately 8 and 11.5 times larger than the fugitive ROG and PM_{10} emission rates, respectively.

4. Extending the agricultural offset program out in time to the hundredth year of the landfill yields the emission balance shown in Table C.4 and Figure C.3. The excess reductions of ROG and PM_{10} are approximately 6 and 14 times larger than fugitive ROG and PM_{10} emission rates, respectively.

4.0 CONCLUSIONS

1. Offsets would be required for landfill stationary source emissions beginning in the fifth year. Sufficient sources of offsets would include agricultural burning that could be diverted, and reduced operation and emissions at the Mesquite Mine. The mine could provide offsets until approximately the fourteenth year of landfill operation while agricultural burning could provide sufficient offsets during the entire landfill lifetime.

2. The amount of agricultural burning that is diverted is determined by the landfill requirement for NO_x offsets. The resulting excess reductions of ROG and PM_{10} are many times larger than fugitive ROG and PM_{10} emitted by the landfill.

3. Mine offsets are fixed during each year of their availability and exceed the landfill offset requirement for stationary sources.

TABLE C.1

STATIONARY POINT SOURCE (FLARE) EMISSIONS FOR FIRST FIVE YEARS (pounds per day)

YEAR	TABLE(1)	NO_x	ROG	PM_{10}	SO_x	CO
1	B.1	14	2	6	3	2
2	B.3	41	7	17	8	7
3	B.5	81	13	33	16	13
4	(2)	120	19	48	23	19
5	B.7	155(3)	25	63	30	25

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(1) Table number in Appendix B.

(2) No table in Appendix B.

(3) This is the first occurrence of a nonattainment pollutant emission that exceeds the offset threshold of 137 pounds per day.

TABLE C.2

MINE OFFSETS FOR FLARE EMISSIONS IN YEAR 10

VARIABLE	TIME BASE	UNITS	NO_x	ROG	PM_{10}	SO_x
Emission Rate	Daily	lb/day	415	67	167	80
	Annual	lb/year	1.5×10^5	2.4×10^4	6.1×10^4	2.9×10^4
Offset Threshold	Daily	lb/day	137	137	137	137
	Annual	lb/year	5.0×10^4	5.0×10^4	5.0×10^4	5.0×10^4
Emissions to be Offset	Daily	lb/day	278	0(1)	30	0(1)
	Annual	lb/year	1.0×10^5	0(1)	1.1×10^4	0(1)
Offset Ratio		--	1.2	1.2	1.2	1.2
Offset Requirement	Daily	lb/day	334	0	36	0
	Annual	lb/year	1.2×10^5	0	1.3×10^4	0
Available Mesquite Mine Offsets	Daily	lb/day	834	56	392	12
	Annual	lb/year(2)	2.5×10^5	1.7×10^4	1.2×10^5	3.6×10^3
Excess Offsets	Daily	lb/day	500	56	356	12
	Annual	lb/year	1.3×10^5	1.7×10^4	1.1×10^5	3.6×10^3

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(1) If emissions do not exceed the threshold, then offsets are not required.
(2) Based on 304 days per year.

TABLE C.3

AGRICULTURAL OFFSETS FOR FLARE EMISSIONS IN YEAR 10

VARIABLE	TIME BASE	UNITS	NO_x	ROG	PM_{10}	SO_x
Emission Rate	Daily	lb/day	415	67	167	80
	Annual	lb/year	1.5×10^5	2.4×10^4	6.1×10^4	2.9×10^4
Offset Threshold	Daily	lb/day	137	137	137	137
	Annual	lb/year	5.0×10^4	5.0×10^4	5.0×10^4	5.0×10^4
Emissions to be Offset	Daily	lb/day	278	0(1)	30	0(1)
	Annual	lb/year	1.0×10^5	0(1)	1.1×10^4	0(1)
Offset Ratio		--	1.2	1.2	1.2	1.2
Offset Requirement	Daily	lb/day	334	0	36	0
	Annual	lb/year	1.2×10^5	0	1.3×10^4	0
Agricultural Burning Offset Conversion Factor		lb/ton(2)	4	9 to 66	13 to 40	13 to 40(3)
Agricultural Plant Material		tons/year	3×10^4	0	1,000	0
Unit Cost of Offsets(4)		$/ton	60	60	60	60
Total Cost of Offsets		$/year	1.8×10^6	(5)	(5)	(5)
Excess Offsets	Daily	lb/day(6)	0	740	~1,000	0(7)
	Annual	lb/year	0	2.7×10^5	3.8×10^5	0(7)

91-296 (3/12/94/rb)

(1) If emissions do not exceed the threshold, then offsets are not required.
(2) Agricultural burning offset conversion factors are in units of pounds of pollutant per ton of plant material burned.
(3) SO_x is treated as equivalent to PM_{10} because it is a PM_{10} precursor.
(4) Estimated by Wes Bisgaard, Director, Farm Bureau, El Centro, California, March 26, 1993.
(5) The diversion for NO_x is adequate to also provide offsets for the other pollutants.
(6) Based on 365 days per year.
(7) Agricultural burning emits no SO_x.

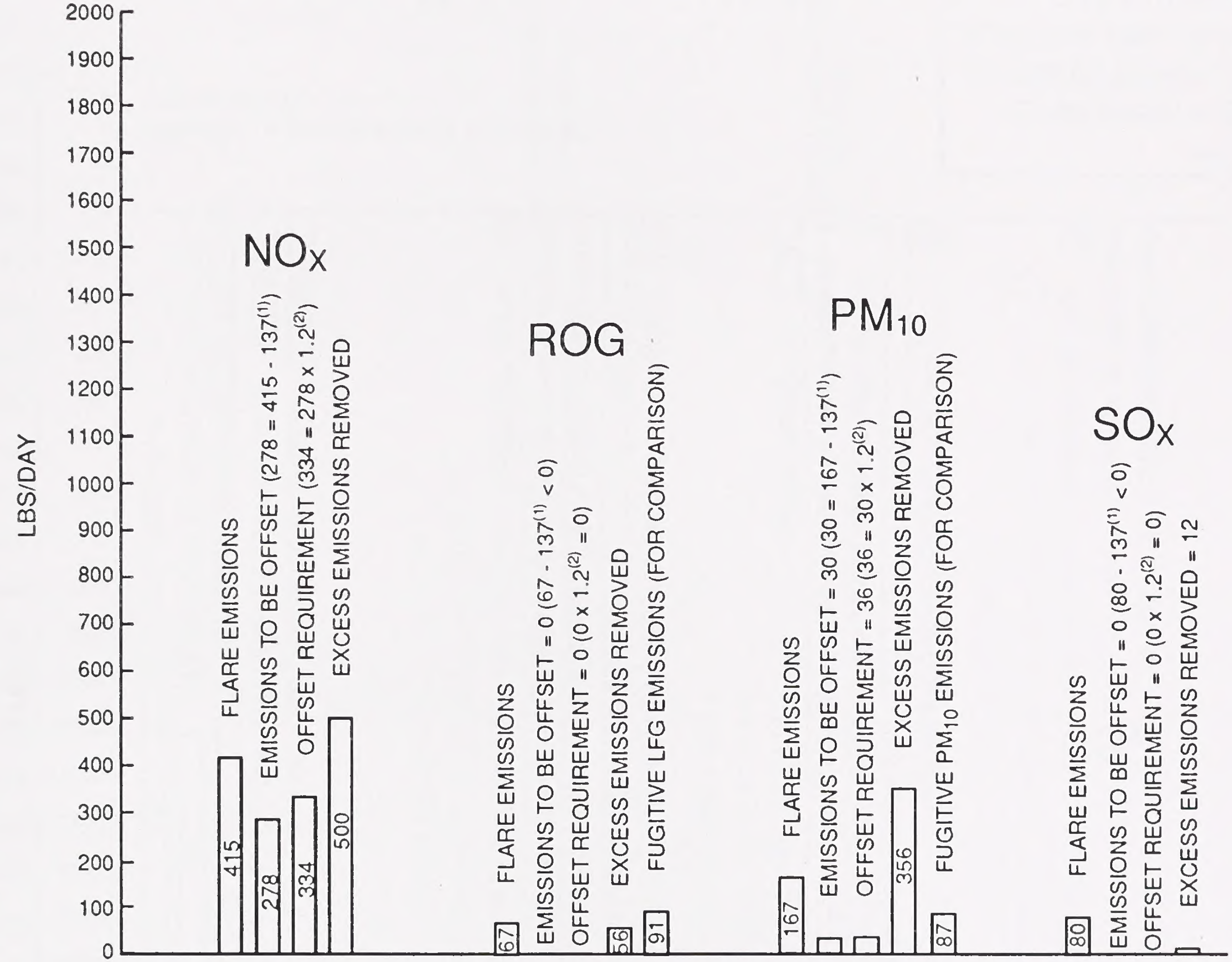
TABLE C.4

AGRICULTURAL OFFSETS FOR BOILER EMISSIONS IN YEAR 100

VARIABLE	TIME BASE	UNITS	NO_x	ROG	PM_{10}	SO_x
Emission Rate	Daily	lb/day	634	31	11	362
	Annual	lb/year	2.5×10^5	1.1×10^4	4.0×10^3	1.3×10^5
Offset Threshold	Daily	lb/day	137	137	137	137
	Annual	lb/year	5.0×10^4	5.0×10^4	5.0×10^4	5.0×10^4
Emissions to be Offset	Daily	lb/day	497	0(1)	0(1)	225
	Annual	lb/year	2.0×10^5	0(1)	0(1)	8.0×10^4
Offset Ratio		--	1.2	1.2	1.2	1.2
Offset Requirement	Daily	lb/day	596	0	0	270
	Annual	lb/year	2.4×10^5	0	0	9.6×10^4
Agricultural Burning Offset Conversion Factor		lb/ton(2)	4	9 to 66	13 to 40	13 to 40(3)
Agricultural Plant Material		tons/year	6×10^4	0	0	7,400
Unit Cost of Offsets(4)		$/ton	60	60	60	60
Total Cost of Offsets		$/year	3.6×10^6	(5)	(5)	(5)
Excess Offsets	Daily	lb/day(6)	0	~1,500	~1,900	0(7)
	Annual	lb/year	0	5.4×10^5	6.8×10^5	0(7)

91-296 (3/12/94/rb)

(1) If emissions do not exceed the threshold, then offsets are not required.
(2) Agricultural burning offset conversion factors are in units of pounds of pollutant per ton of plant material burned.
(3) SO_x is treated as equivalent to PM_{10} because it is a PM_{10} precursor.
(4) Estimated by Wes Bisgaard, Director, Farm Bureau, El Centro, California, March 26, 1993.
(5) The residue diversion for NO_x is adequate to also provide offsets for the other pollutants.
(6) Based on 365 days per year.
(7) Agricultural burning emits no SO_x.



(1) THRESHOLD EMISSION RATE FOR OFFSETS
(2) OFFSET RATIO = 1.2

FIGURE C.1

COMPARISON OF MINE OFFSETS FOR FLARE EMISSIONS WITH FUGITIVE PM_{10} AND FUGITIVE LANDFILL GAS EMISSIONS IN YEAR 10

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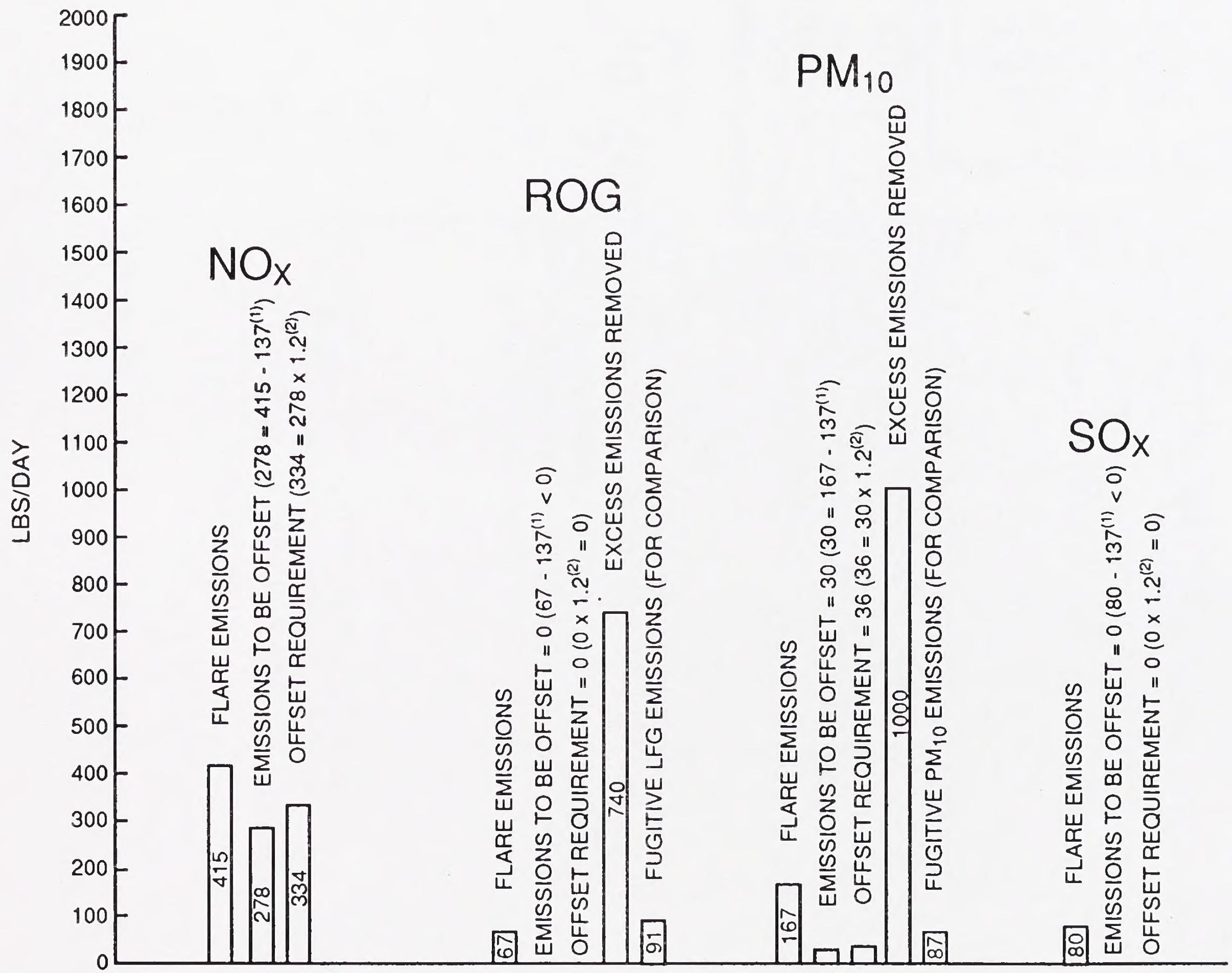
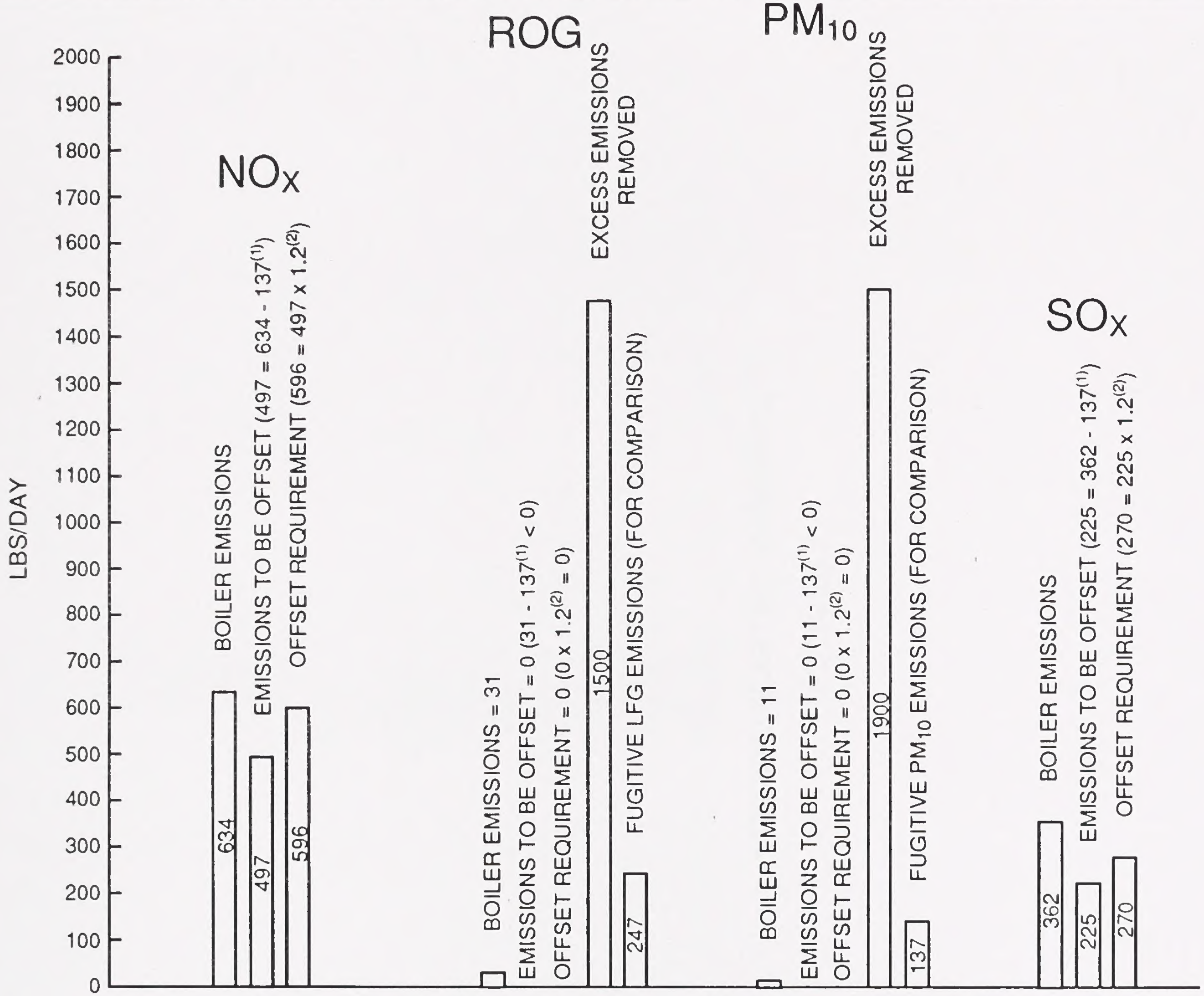


(1) THRESHOLD EMISSION RATE FOR OFFSETS
(2) OFFSET RATIO = 1.2

FIGURE C.2

COMPARISON OF AGRICULTURAL OFFSETS FOR FLARE EMISSIONS WITH FUGITIVE PM_{10} AND FUGITIVE LANDFILL GAS EMISSIONS IN YEAR 10

ENVIRONMENTAL SOLUTIONS, INC.



(1) THRESHOLD EMISSION RATE FOR OFFSETS
(2) OFFSET RATIO = 1.2

FIGURE C.3

COMPARISON OF AGRICULTURAL OFFSETS FOR BOILER EMISSIONS WITH FUGITIVE PM_{10} AND FUGITIVE LANDFILL GAS EMISSIONS IN YEAR 100

ENVIRONMENTAL SOLUTIONS, INC.

APPENDIX D
COACHELLA VALLEY BOX MODEL

APPENDIX D

COACHELLA VALLEY BOX MODEL

INTRODUCTION

1. The proposed Mesquite Regional Landfill would be located in eastern Imperial County near Glamis, California, and would be the disposal site for municipal solid waste (MSW) residue hauled by train from an intermodal facility at the Los Angeles Transportation Center. The route is the Southern Pacific main line east from Los Angeles through SOCAB, across the Banning Pass, into Coachella Valley, past the Salton Sea, and through Imperial County on its way to Yuma, Arizona.

2. The use of rail-haul to remove the MSW residue from SOCAB and the associated elimination of Class III landfills from SOCAB that would no longer be needed would benefit SOCAB by reducing ozone (O_3) precursor emissions by 720 pounds per day of nitrogen oxides (NO_x) and 720 pounds per day of reactive organic gases (ROG). Nonattainment pollutant emissions from stationary sources at the proposed Mesquite Regional Landfill above new source review thresholds would be offset by emission reductions from reduced burning of agricultural residues, reduction in emissions from the adjoining Mesquite Mine, or other sources in Imperial County. Train emissions in Coachella Valley would be qualitatively offset by reduced transport of precursors and O_3 from SOCAB into Coachella Valley through Banning Pass.

3. The purpose of this appendix is to estimate the maximum air quality impact of the rail-haul trains passing through Coachella Valley. A simple model is used that represents Coachella Valley as a box into which the trains emit criteria air pollutants, and wind blowing down the valley carries the pollutants and reaction products out of the box.

"BOX MODEL" APPROACH

1. The "box" through the Coachella Valley has length L centered along the rail line, width W, and mixing layer height H. We assume that two trains, one in either direction, travel through the box for some interval of time T, given by

$$T = L/V \qquad (1)$$

where V = speed of a train. If each train emits a pollutant i at the emission rate E_i (mass per unit time), the mass emitted in the box during the joint passage of both trains is M_i, given by

$$M_i = 2E_iT \tag{2}$$

If the mass of pollutant is dispersed throughout the box, the resulting concentration C_i is given by

$$C_i = \frac{2\ E_iT}{WHL} \tag{3}$$

Combining equations (1) and (3), the concentration becomes

$$C_i = \frac{2\ E_i}{WHV} \tag{3}$$

which is independent of the length of the box. For a pollutant like O_3, we assume that every molecule of NO_x or ROG emitted will photochemically react to form a molecule of O_3.

2. To determine if the concentration C_i will be increased by the passage of subsequent trains, we look at the frequency of passages and the speed at which the pollutants travel down Coachella Valley.

3. Each day five trains haul 20,000 tons of MSW residue to the landfill, leading to an average interval of 4.8 hours between trains. The average wind speed in the Coachella Valley is about nine miles per hour and its direction is parallel to the tracks. We will define a conservative situation as a wind blowing at three miles per hour, and represent this wind speed by u_{min}. At this speed, it will take the following time interval Δt for the wind to clear the box of emissions and reaction products from a train, and given by

$$\Delta t = \frac{L}{u_{min}}$$

If L = 50 miles, then Δt = 16.7 hours. During this interval, three trains could enter the box before the emissions of the first cleared. Counting trains in both directions, the maximum anticipated case would have the emissions from six trains affecting the air quality in the box, and Equation 3 becomes the following:

$$C_i = \frac{6\ E_i}{WHV} \tag{4}$$

CALCULATIONS

1. We assume that locomotives would emit the maximum amount of pollutants per unit time, which would happen with the locomotive throttles placed at full power (Notch 8). Table D.1 lists the criteria air pollutant emissions and O_3 in Column 1. Column 2 contains the emission rate per locomotive; Column 3 contains the rate per train (four locomotives); and Column 4 contains the rate per six trains possibly passing through the box before the wind clears the box. We assume the mixing height H = 1,000 feet, although it reaches 16,000 feet on summer afternoons in the middle of the "O_3 season." We assume the width of the valley W = 16 miles, and the speed of the train V = 50 miles per hour.

SAMPLE

$$C_{NO_x} = \frac{2{,}184 \text{ lb/hr} \bullet 10^9 \ \mu\text{g/kg}}{16 \text{ mi } (1{,}000 \text{ ft.}) \ 50 \text{ mi/hr } 2.2 \text{ lb/kg } 5{,}280^2 \text{ ft}^2/\text{mi}^2 \bullet 0.3048^3 \text{ m}^3/\text{ft}^3}$$

$$= 1.6 \ \mu\text{g/m}^3$$